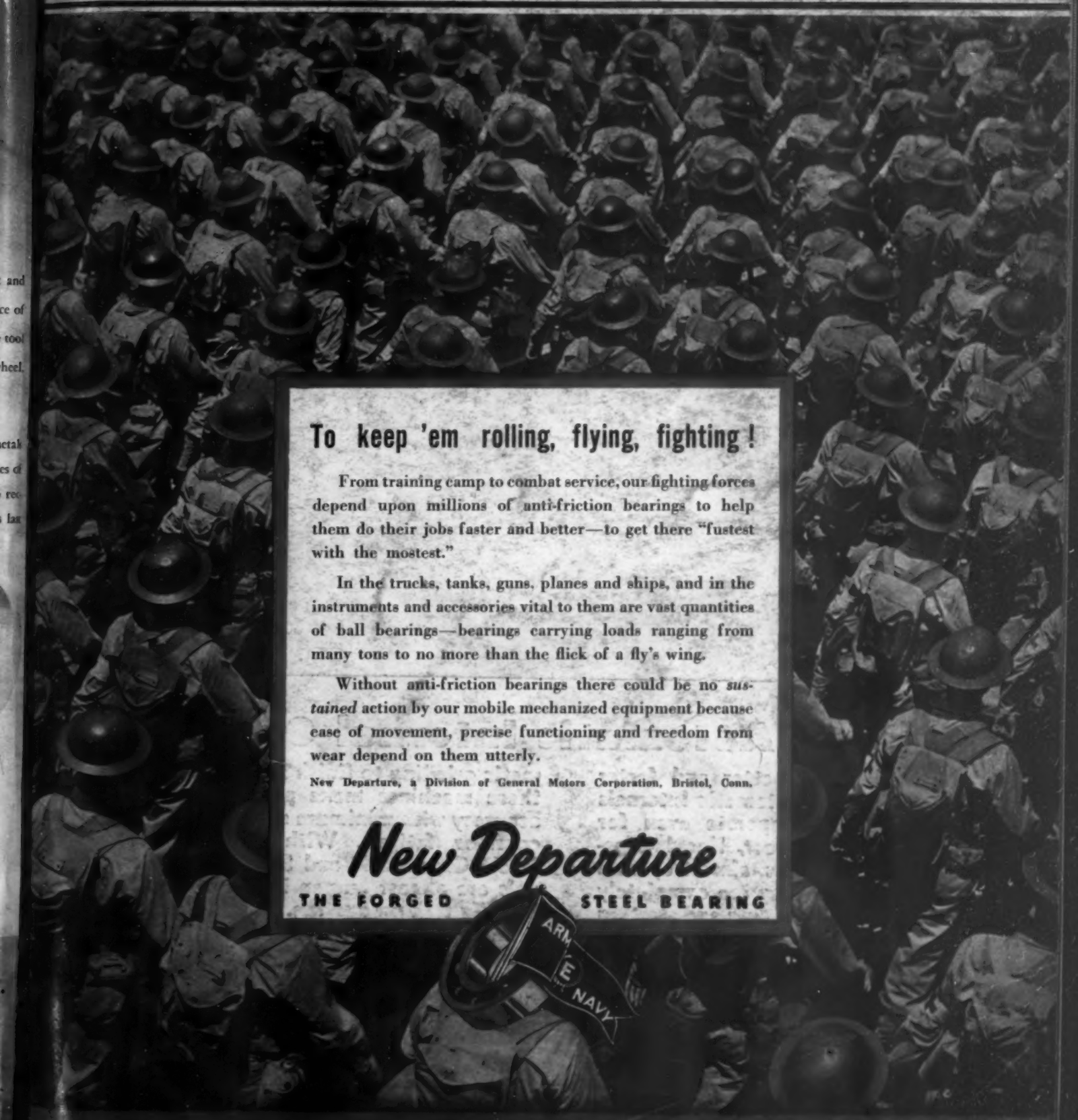
February 1, 1943

STEEL

PRODUCTION • PROCESSING • DISTRIBUTION • USE

ESTABLISHED 1882



To keep 'em rolling, flying, fighting!

From training camp to combat service, our fighting forces depend upon millions of anti-friction bearings to help them do their jobs faster and better—to get there "fustest with the mostest."

In the trucks, tanks, guns, planes and ships, and in the instruments and accessories vital to them are vast quantities of ball bearings—bearings carrying loads ranging from many tons to no more than the flick of a fly's wing.

Without anti-friction bearings there could be no *sustained* action by our mobile mechanized equipment because ease of movement, precise functioning and freedom from wear depend on them utterly.

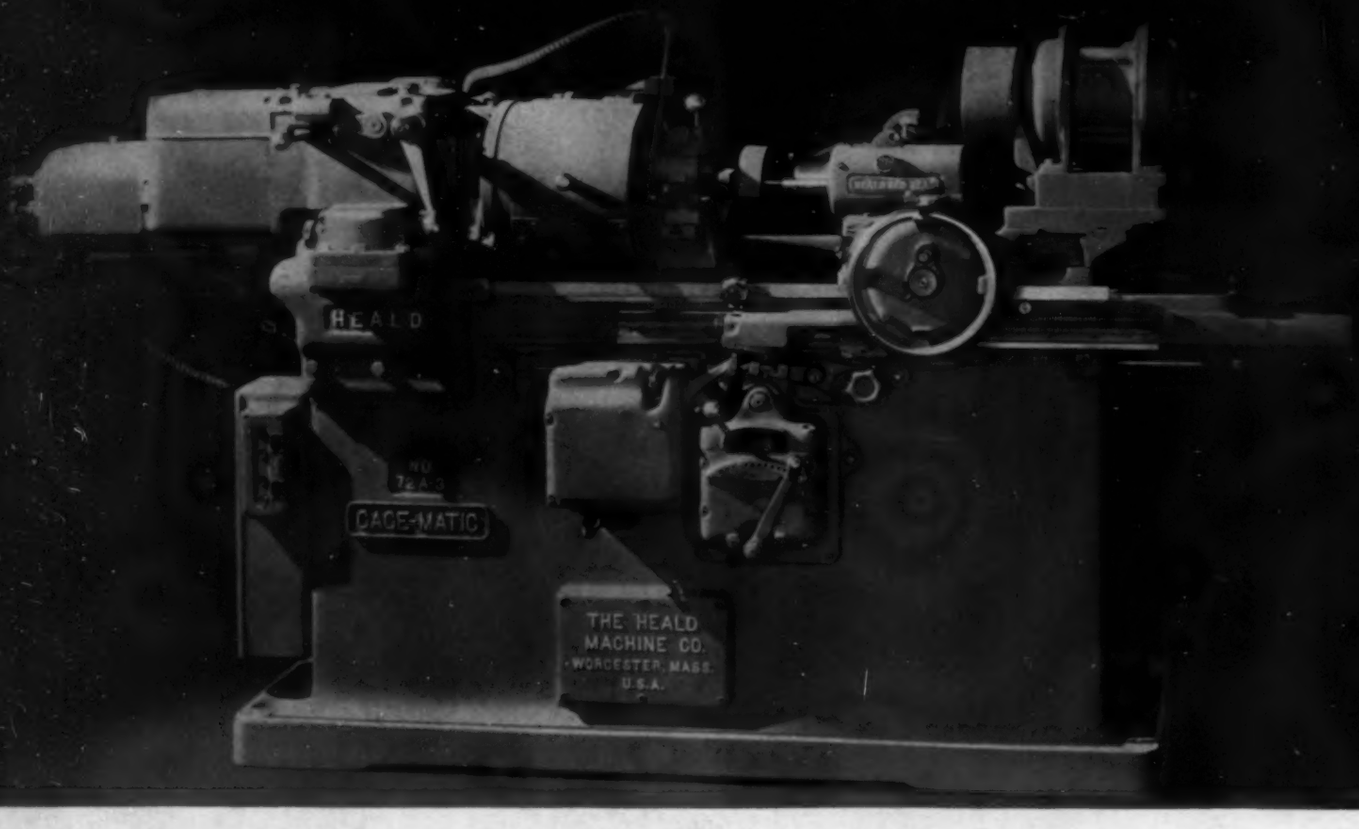
New Departure, a Division of General Motors Corporation, Bristol, Conn.

New Departure

THE FORGED STEEL BEARING

ON THE NOSE EVERY TIME

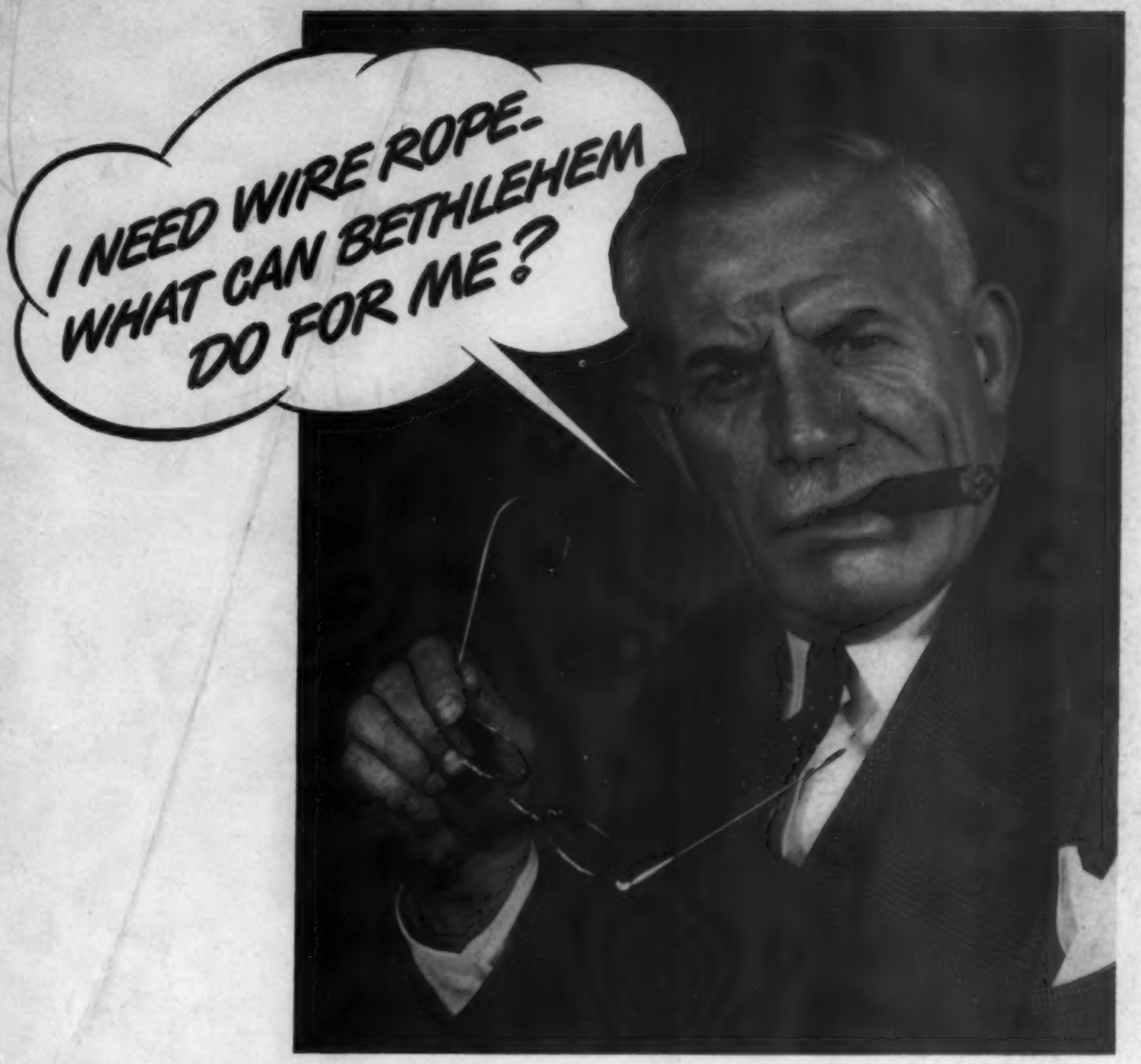
EVEN WITH AVERAGE OPERATORS



Thanks to Automatic Internal Grinding

You're bound to do better and faster grinding with Heald Automatic Internals – they're so easy to operate even for average operators. In fact, Heald Gage-Matics and Size-Matics almost operate themselves, because they are completely automatic except for loading and starting the machine. Their automatic features include automatic grinding to semi-finish size, automatic wheel truing, and automatic grinding to finish size. As a result, these machines make possible uniform accuracy with minimum scrap and reduce operator fatigue. With such features Heald Gage-Matic and Size-Matic Internals are almost human in operation and literally talk production. They'll talk any grinding job into higher production and closer accuracy. Complete information on request.

THE HEALD MACHINE CO. *WORCESTER, MASS. U. S. A.*



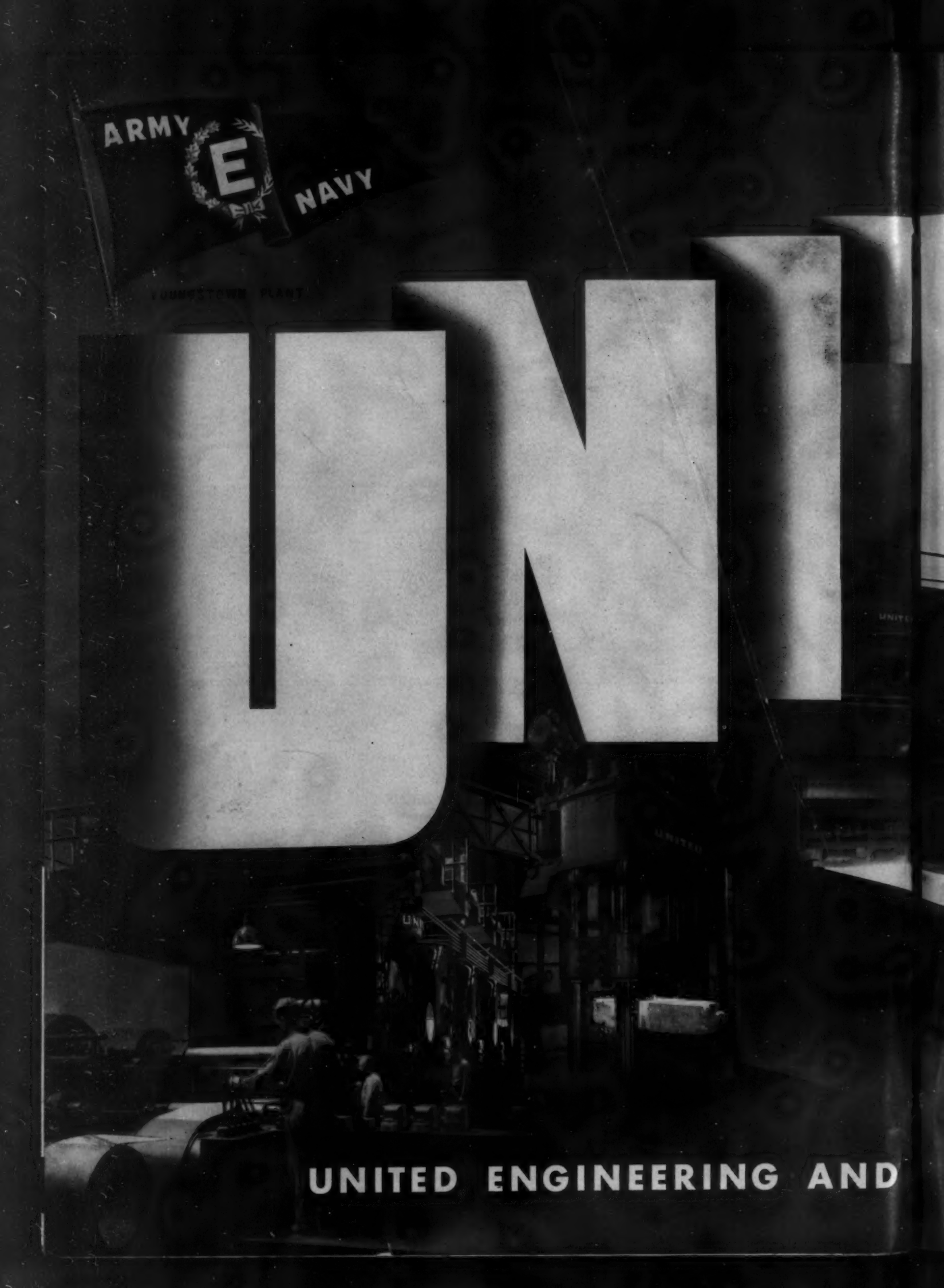
Bethlehem Wire-Rope distributors can supply you with a full range of wire rope, either from stock, or on prompt mill order. Bethlehem's mills are making rope at top speed, night and day. We produce a size, grade of steel, construction and type of center to handle every job in the contracting field.

Due to war emergencies—unexpected red-rush orders for military wire ropes—we can't promise ahead of time just how fast we can deliver. We *can* say, however, that we'll do our level best on every order. If you're working on a war contract or some war-related job, you can expect to get your rope within your normal time requirements.

There are more than 260 Bethlehem Wire-Rope distributors in key locations throughout the United States. They know wire rope thoroughly, and are always willing and able to help contractors. Why not give your local Bethlehem Wire-Rope distributor a ring? He'll be glad to hear from you . . . to help you in any way he can.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY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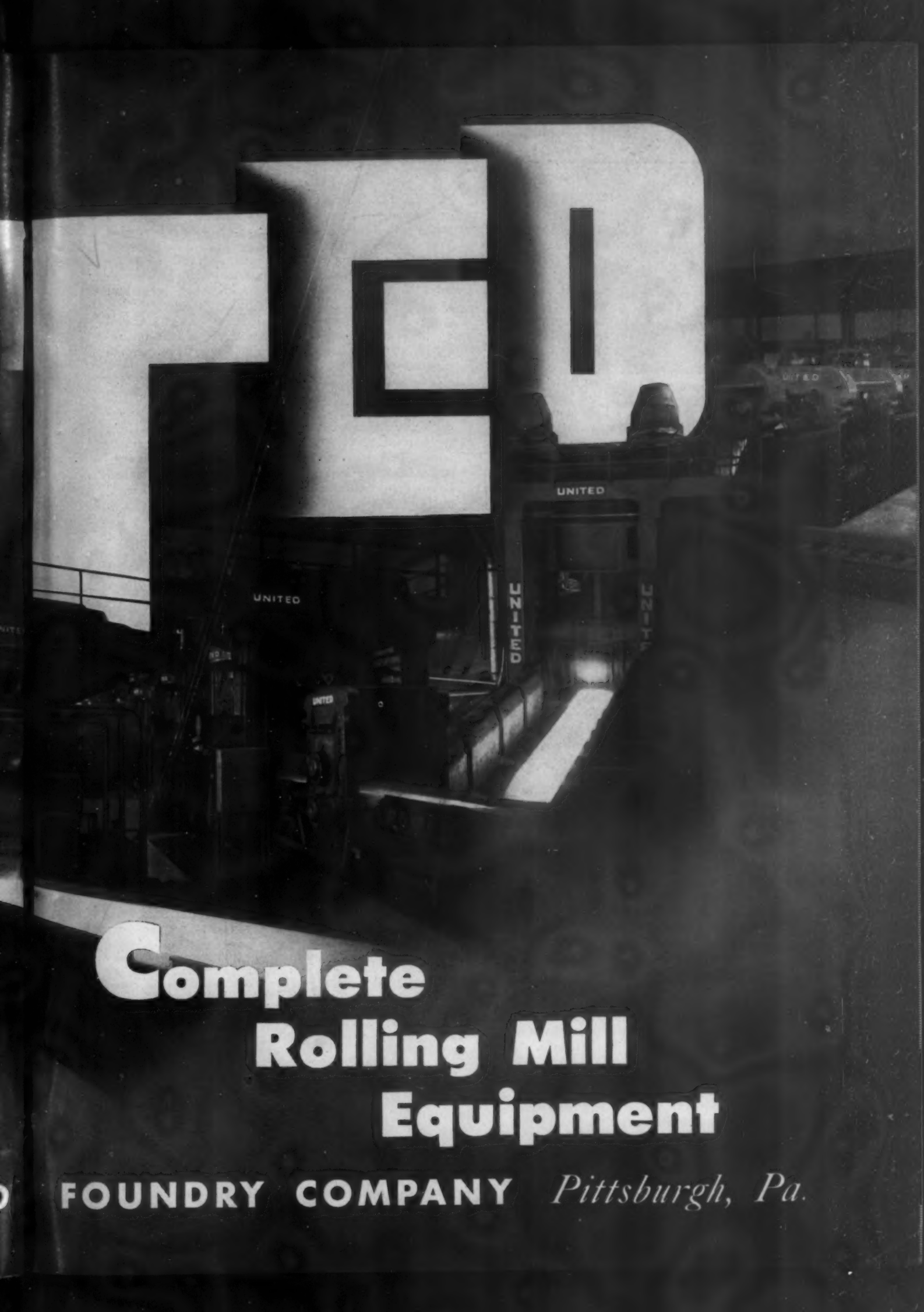

Complete Rolling Mill Equipment

FOUNDRY COMPANY *Pittsburgh, Pa.*

BEHIND THE SCENES

The Editors' Roundtable

E. C. Kreutzberg, Editor of STEEL

■ Based on a large amount of experience at Washington, over a period of many years, this writer is convinced that industry in general is loser by having less understanding of government than it should have. Most manufacturers have a real fear of the government; an invitation to appear before a Congressional committee, or a communication from the Treasury Department or Department of Justice is apt to give them the jitters.

It is true that Congress and certain departments of the government are not always predictable—it is true that industrialists on numerous occasions have been subjected to treatment they did not consider fair. It readily can be understood why such men might want to have as little to do with the government as possible and follow a policy of keeping out of the government's sight insofar as that can be done.

Such a policy is not a wise one, particularly in these days when Washington sets up the framework and operates the red and green lights that control business. At a time when a manufacturer has nothing to say as to where he sells his product, when he has nothing to say about prices he charges or that he pays, when he has nothing to say about wages he pays his employes, and when he has little to say about his labor policy, he stands to gain by finding and having friends in the government.

This is all the more true for the reason that government control of business is sure to continue elaborate in the postwar period.

The postwar plans sponsored by this administration are aimed at full employment and high productivity, and prevention of the alternate booms and depressions which formerly featured our economy. Through control of money, through methods of taxation, through a program of government-financed public improvements and by fully using private enterprise, the administration hopes to attain its objective. It is a bold, ambitious plan that challenges full attention from all key men in industry. Its main features are being set forth in the Windows of Washington section from week to week. As it made clear in this series of articles, the plan is the product of men of broad practical business experience, rather than of theorists.

In fact, a profound change has been reflected in Washington over the past year. The war has exploded many of the unsound theories about business that were so widely discussed before Pearl Harbor. There now is a general appreciation of the fact that without our private enterprise system, including both large and small organizations, we could not produce for war as we are. There also is a general appreciation of the fact that we must rely on private enterprise if we are to have full employment and high productivity after the war.

Today the manufacturer will find many friends in the government—if he will only seek them out. He can get a lot of help if he will explain the sort of help he needs. This writer will go so far as to say that he does not know of a single government department that will fail to respond to a bid for friendly, fair attention, provided always that the manufacturer is frank and above-board and lays all his cards on the table. That is extremely important. In most cases where harsh treatment is meted out it usually results from the impression that the recipient has been trying to put something over on the government.

The foregoing holds true in regard to the much discussed subject of renegotiation of contracts. Instead of fearing this as a bug-a-boo which possibly can be escaped by hiding under the bed clothes, manufacturers will do well if they face this thing squarely and voluntarily. It is a strictly business proposition and in no instance has any manufacturer suffered when he has stepped forward and dealt with the government as "man to man" in this matter of adjusting his profits on war work so as to keep them within reasonable limits.

Manufacturers can do themselves and the country a lot of good by seeking out friends in the government. They are to be found in large numbers. A lot is said about the evils of bureaucracy—and a lot of this talk is justified. At the same time when one penetrates behind the bureaucratic mask one finds that bureaucracies are constituted of human beings, men who respond just as quickly to a friendly approach as anyone in business.

A good many manufacturers have discovered the truth of this statement in recent years. In fact, much of our government personnel of today has been recruited from the ranks of businessmen and manufacturers who originally went to Washington to get acquainted with the government. Men like W. L. Batt, Donald M. Nelson, W. A. Harriman, E. R. Stettinius Jr., Charles R. Hook, W. Gibson Carey Jr.—to mention only a very few. Not to be overlooked is the influence these men have brought to bear in respect to present government attitude toward business.

Rich dividends can be obtained through a better understanding of government!

Thirty Three Years of "Know-How"

■ *E. (for Edgar) C. Kreutzberg, editor of* STEEL *for the past six years and contributor this week to the Editors' Roundtable, knows wartime Washington as few business paper editors do. He has personal friendships of long standing with many an executive now with WPB, OPA and other government agencies. From the time he first joined* STEEL*'s staff back in* 1910 *Ed Kreutzberg has made it a point to get thoroughly acquainted not only with the industry as such but with the men who make the industry. From Princeton he came to* STEEL*'s New York office from which he covered the eastern section of the country. In* 1931 *he conducted a National Steelworks Survey, spending six months visiting the steel mills throughout the country. Mr. Kreutzberg came to Cleveland in* 1934 *as Engineering Editor and was appointed Editor in* 1937. *More recently he has been spending more and more time in Washington, reporting and interpreting developments of vital interest to the readers of* STEEL *and at the same time clarifying industry's position with government officials on various phases of the war production program. His present series on postwar planning, the second article of which is under "Windows of Washington" this week, is a particularly timely report which you will not want to miss.*

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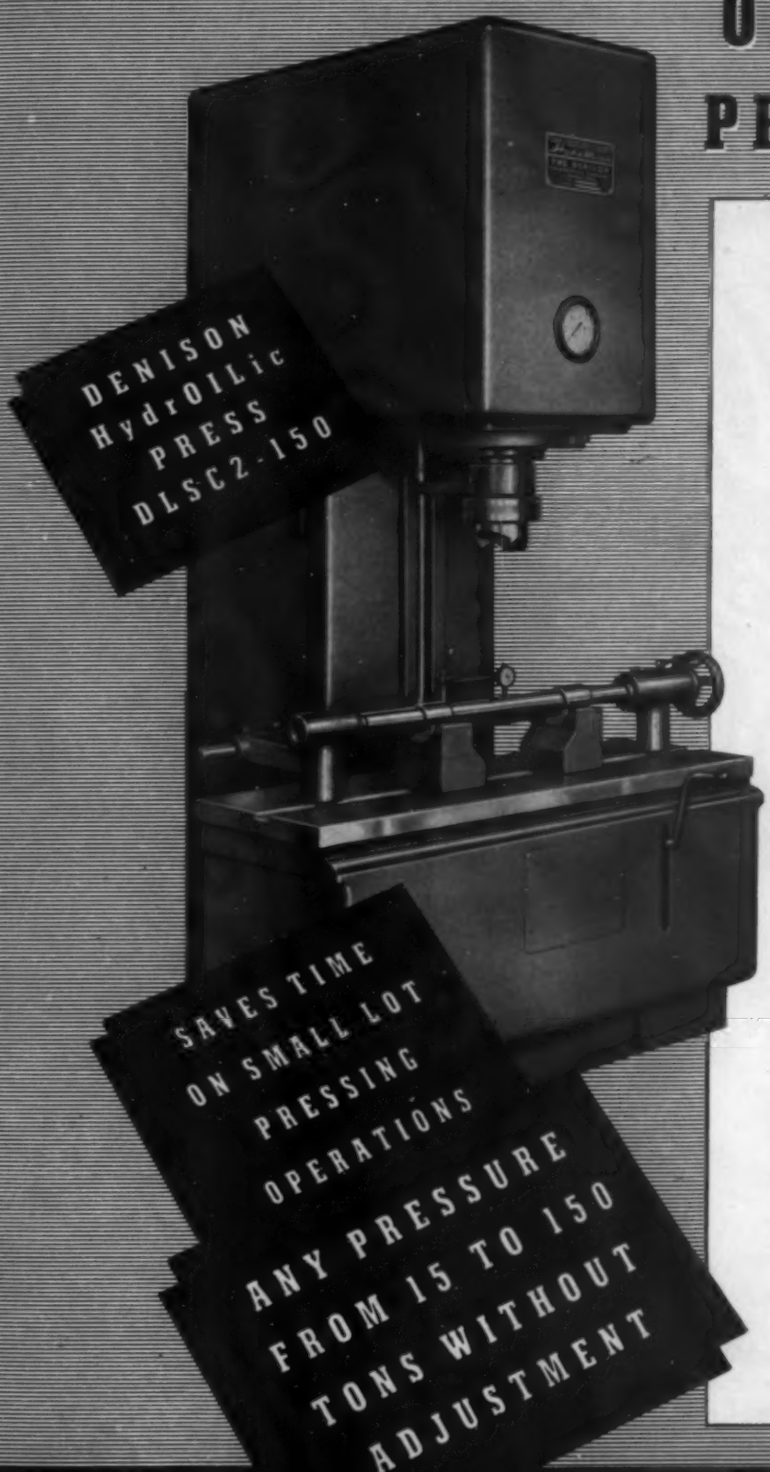
Editorial Contents—Page 45

WAR-TIME PRODUCTION SPEED ON ONE-OF-A-KIND PRESSING JOBS!



The high-speed efficiency which Denison HydrOILic Presses show on straight production-line work, can be closely approached on small-lot operations. Operating features of the new 150-ton HydrOILic Straightening Press shown here are typical . . . this press enables your operator to select the exact pressure needed for each different operation *without making adjustments* (stroke and pressure limits may be pre-set if desirable). Through a single, "feel-the-action" lever, he has full control of both movement and power of the ram at every stage of the operation . . . the pressure gauge shows him exact tonnage exerted at all times.

When the control lever is released, the ram returns immediately to full daylight opening (or to the pre-set upper stroke limit). Hydraulically held in the up position until the next operation, there's no "drift."

Like all Denison Presses, DLSC2 is fully self-contained. Yet all working parts are easily accessible. This clean-cut, compact press has rounded corners and edges for maximum safety. Ample toe space permits the operator to avoid hazardous leaning.

DLSC2 Presses are available with either hand-lever or footpedal control, or both. Working pressures range from 15 to 150 tons. Four sizes offer maximum capacities of 25, 50, 100 and 150 tons. For complete details, call your Denison representative, or write us today.

The **DENISON**
ENGINEERING COMPANY
1163 DUBLIN RD., COLUMBUS, OHIO

DENISON
EQUIPMENT *in* APPLIED
TRADE-MARK *Hydr ics*

POWER
-packaged for Victory

DEADLY in its compact power—this carrier-based plane provides the sting that makes great naval air victories possible.

"A motor with wings," it has been aptly termed, for a single engine of more than 2,000 horsepower roars this mighty ship to Victory.

Engines of such tremendous horsepower are possible because of new techniques in engineering and manufacture, not the least of which have been the advances made in the Foote Bros. Gears that power them. For an engine of this size—swinging propellers at high speed offers problems in gear design and manufacture that, until a few months ago, might well have been considered unsolvable.

How well these problems were solved is evidenced by the flow of Pratt & Whitney engines rolling off production lines in huge engine plants throughout the country. The extreme precision of the gears is a tribute to the engineering back of them, but even more to the new methods of manufacture that have made their mass production possible.

When the war is won these gears, produced in the Precision Gear Plant of Foote Bros., can be applied to peacetime engines and peacetime machines. Manufacturers are then assured of a new era in the transmission of power through gears and speed reducers—an era of more compact, more efficient machines.

FOOTE BROS. GEAR AND MACHINE CORPORATION
5301 South Western Boulevard • Chicago, Illinois

FOOTE BROS.

Better Power Transmission Through Better Gears

SAE 4130 aircraft screw ⅜" hex. head, ⅜" body, 2" long, threaded 1" on Model B Cleveland Single Spindle Automatics. Tool-life increased 25% . . . using *Texaco Sultex B.*

CHANGING cutting coolants on this job of machining Molybdenum steel aircraft screws produced as good a finish, but TOOL-LIFE increased 25%.

The cutting coolant that made this substantial improvement was *TEXACO Sultex Cutting Oil B.*

This is one more instance of the fact that the selection of *Texaco Cutting Oil* not only can increase tool-life, but by keeping down the heat, can prevent chip welding, improve finish, reduce tool adjustment, minimize spoilage.

The outstanding performance that has made Texaco preferred in the fields listed in the panel has made it preferred by prominent users in the metal-cutting field.

Texaco users enjoy many benefits that can also be yours. A Texaco Engineer specializing in cutting coolants will gladly cooperate . . . just phone the nearest of more than 2300 Texaco distributing points in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York, N. Y.

THEY PREFER TEXACO

★ More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.

★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

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TEXACO Cutting and Soluble Oils
FOR FASTER MACHINING

TUNE IN FRED ALLEN EVERY SUNDAY NIGHT—CBS ★ HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY

Nowhere is there a better example of Washburn care and precision than in Eagle MUSIC WIRE. Our own basic steel—close tolerances and care in handling, all make for superlative quality.
WASHBURN
WASHBURN WIRE CO., NEW YORK CITY

CLEAN, UNIFORM BILLETS—STRIP—RECTANGULAR, ROUND, FLAT RODS
TEMPERED AND UNTEMPERED FLAT AND ROUND HIGH CARBON WIRES

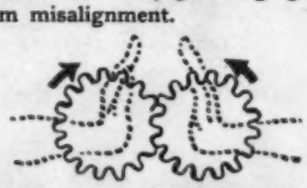
Neglect a Motor AND YOU Sabotage a Motor!

WHOSE MOTORS LAST LONGEST MAY HAVE A LOT TO DO WITH WHO WINS THIS WAR!

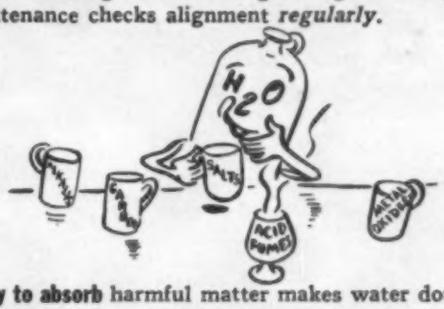
AS ONE of the world's leading builders of electric motors, Allis-Chalmers takes its hat off to the men of maintenance who are working day and night to keep America's motors *rolling!*

Like an overloaded horse, a motor worked too far beyond its horsepower capacity is sure to break down. So while maintenance men know that we've got to get maximum protection out of every motor to win this production war . . . they also know that a close eye must be kept on every motor's overload protection. New fuses and heater coils are a whole lot cheaper than new motors!

The oil film protecting a motor's bearings often is no thicker than the wall of a soap bubble. And if pressure on it becomes too great, the film can fail just as suddenly and *completely!* To protect bearings, maintenance must first protect the *oil film* . . . by guarding against excessive pressures from misalignment.



Spur gears constantly try to push apart, foundations are apt to settle, floor loading can be too heavy . . . all threatening to disturb alignment. Misalignment sometimes gives a warning before causing damage. But to play safe, maintenance checks alignment *regularly.*



Ability to absorb harmful matter makes water doubly dangerous. Evaporated moisture is pure water when it first condenses in a motor — isn't yet an active destructive agent. That's the time to get it out — *fast!*

Dust fights lubrication. Once inside bearings, it can be as harmful as sandpaper to highly polished surfaces. To keep dust out, oil filler caps must be kept closed — dust seals and gaskets replaced when worn.

Is Allis-Chalmers' new maintenance handbook helping maintenance do its big new wartime job in *your* plant? It's the latest and last word on the subject, easily understood, abundantly illustrated (with dozens of sketches such as above). Send in today for *your* free copy to ALLIS-CHALMERS MFG. CO., MILWAUKEE, WIS.

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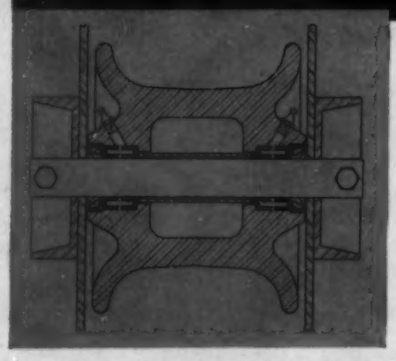
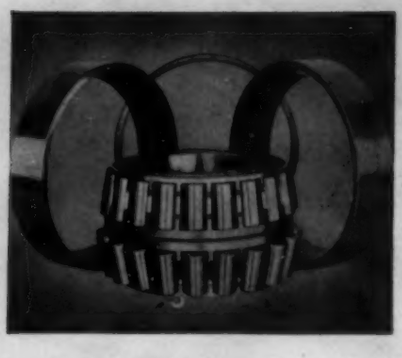
ALLIS-CHALMERS

WE WORK FOR VICTORY WE PLAN FOR PEACE

IN THE NEWS
WITH BANTAM BEARINGS

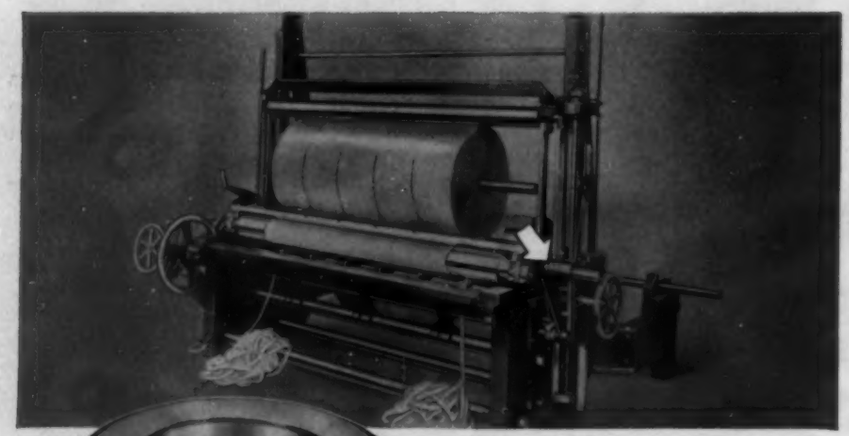


MECHANICAL "STEVEDORES" like this 5-ton STEVE-KRANE built by Silent Hoist Winch & Crane Co. are playing an important part in speeding the loading of goods and equipment for distant fronts. And Bantam Quill Bearings on the boom sheaves and rollers (shown in cross-section view) contribute to the efficiency of these cranes, because of their low co-efficient of friction, high load capacity, and effective method of lubrication—while their unit construction facilitates assembly. For full details on these compact anti-friction bearings, write for Bulletin H-104.

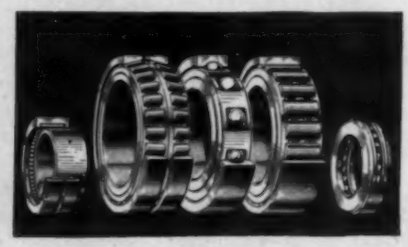


38" O.D., 21" I.D., 19½" LONG, this two-row tapered roller bearing for steel mill service is a typical instance of Bantam's skill in the design and manufacture of large bearings for special jobs. To meet the needs of America at war, Bantam today is manufacturing some of the largest anti-friction bearings ever built.

METALLURGICAL CHECK-UP is a regular part of Bantam inspection on bearings of all types. Here the grain structure of rollers and races is undergoing microscopic examination to assure conformity to metallurgical specifications.



FAST, ACCURATE SLITTING of paper is the job of the Camachine 8, Model 10, product of Cameron Machine Company. Among the factors in the popularity of this machine in paper mill finishing rooms and converting plants is the use of Bantam Ball Thrust Bearings.



ENGINEERING COUNSEL based on the design and application of straight roller, tapered roller, needle, and ball bearings is a vital phase of Bantam's service to industry. If you are seeking competent advice on your anti-friction bearing problems, TURN TO BANTAM.

ARMY E NAVY

BANTAM BEARINGS

STRAIGHT ROLLER · TAPERED ROLLER · NEEDLE · BALL

BANTAM BEARINGS CORPORATION · SOUTH BEND · INDIANA

SUBSIDIARY OF THE TORRINGTON COMPANY · TORRINGTON, CONN.

THE Beginning OF Better Steel

WHAT SUPERIOR IS DOING BETTER FOR WAR TODAY, IT WILL DO BETTER FOR YOU TOMORROW

The pressure of war demand for high quality steel is emphasizing the importance of scrap. To the layman scrap may mean a short cut in steel making; but to the metallurgist scrap is the secret of quality control. Sorting scrap by scientific selection enables the steel maker to control the properties of open hearth steel to a precision not practical in any other way.

SUPERIOR sheets have always been made largely of open hearth, special analysis steel in which scrap is an important ingredient. Superior's specialized experience in the production of steel sheets of all kinds means a *superior* product.

Remember, one ton of your idle scrap makes two tons of fighting steel. Search your plant again and again.

THE SUPERIOR SHEET STEEL COMPANY
CANTON, OHIO
Division of Continental Steel Corporation, U.S.A.

Sold under well-known trademarks, SUPERIOR steel sheets are made with more than 30 different kinds of surface treatments, finishes and coatings to suit the needs of manufacturers and sheet metal workers.

CONTINENTAL SUPERIOR STEEL

SUPERIOR

CONTINENTAL STEEL CORPORATION

FOR SALE

USED STEEL MILL MACHINERY AND EQUIPMENT

250 TON HOT METAL MIXER

12" DIAMETER BLAST FURNACE BELL 45°

FOUR (4) BLOOMING MILL STACKS

NO. 3460 DIXIE NON-CLOG CRUSHER

PUNCH & SHEAR (LONG & ALSTATTER)

RECIPROCATING PUMP (LAIDLOW-DUNN GORDON COMPOUND DUPLEX)

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EVAPORATOR AND PUMP (GRISCOM-RUSSELL)

OPEN FEED WATER HEATER (GRISCOM-RUSSELL)

VACUUM PUMP (INGERSOLL-RAND)

NO. 9 CONTRAFLO DEAERATING HEATER

OIL HYDRAULIC UP-CUT BLOOM SHEAR

BAR TWISTER MACHINE

WESTINGHOUSE STEAM DRIVEN AIR COMPRESSOR

TYPE Z-1 TERRY STEAM TURBINE

TROY 4-½" x 5" VERTICAL, THROTTLING, SELF-OILING ENGINE

MOTORS

Included in our list of used equipment are 25 AC and DC motors put out by leading manufacturers of the country and ranging in size up to 75-horsepower.

CONTROL EQUIPMENT

A quantity of steel mill control equipment, mostly General Electric and Westinghouse are also available for immediate shipment.

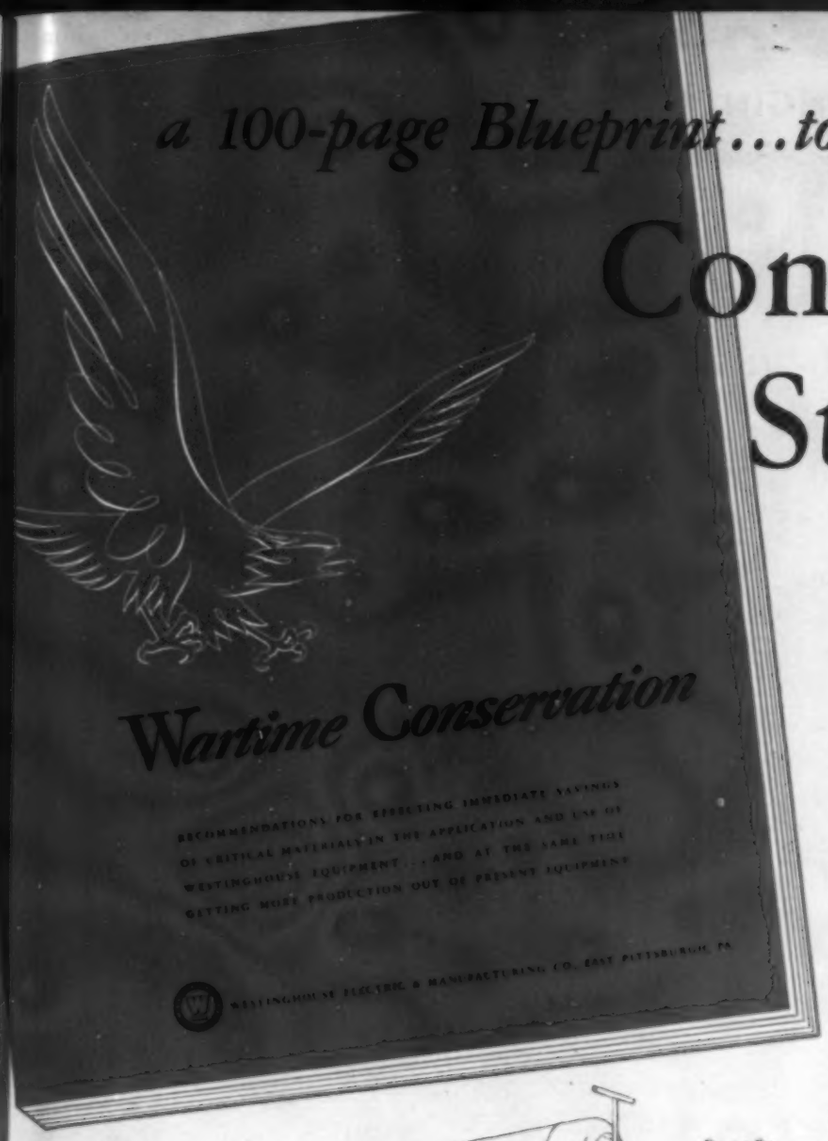
INTERNATIONAL HARVESTER COMPANY
WISCONSIN STEEL DIVISION

180 NORTH MICHIGAN AVE. **CHICAGO, ILLINOIS**

PHONE: ANDOVER 4200

a 100-page Blueprint...to help you plan your

Conservation Strategy



THIS BOOK CONTAINS DEFINITE RECOMMENDATIONS...

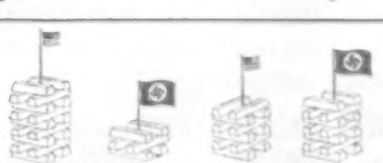
- **From generator to motor...** Critical Material savings in selection, application and use of electrical equipment.
- **On the production line...** New methods of speeding production made possible by Westinghouse developments.
- **Keep 'em running!** Maintenance and repair service as an aid to production.
- **Replacement—not substitution...** Micarta and Prestite are superior to the Critical Materials which they replace.
- **All in the day's work...** How Westinghouse is saving Critical Materials in its own manufacturing operations.

We no longer are "too rich" to worry—the Axis has more Critical Materials than we do.

To help America save Critical Materials . . . to assist industry in planning its conservation strategy, Westinghouse has published an authoritative 100-page book. It contains recommendations for effecting immediate savings of Critical Materials in the selection, application and use of electrical equipment . . . and at the same time getting more production from present equipment.

Write for your copy today (company letterheads, please!). Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., Dept. 7-N. J-90461

Comparison of United Nations and Axis resources prior to war and today



	Before the war		*Now*	
	United Nations	*Axis*	*U. Nations*	*Axis*
STEEL	73%	27%	50%	50%
COPPER	94%	6%	83%	17%
TIN	99+%	1–%	35%	65%
ALUMINUM	68%	32%	42%	58%
PIG IRON	75%	25%	44%	56%
TUNGSTEN	95%	5%	65%	35%
MAGNESIUM	44%	56%	32%	68%

Westinghouse

PLANTS IN 25 CITIES ...OFFICES EVERYWHERE

TUBE MILLS

COMPLETE. A coil of strip steel is edge conditioned, formed into a butt seam tube, electrically welded, flash trimmed, cooled, sized, straightened and cut to length, continuously, automatically by a YODER TUBE MILL LINE.

YODER EXPERIENCE in the development of Tube Mill Equipment insures your getting the best in patentable features and the latest in improvements.

SATISFIED CUSTOMERS will testify to the soundness of Yoder engineering practices and quality manufacturing policies.

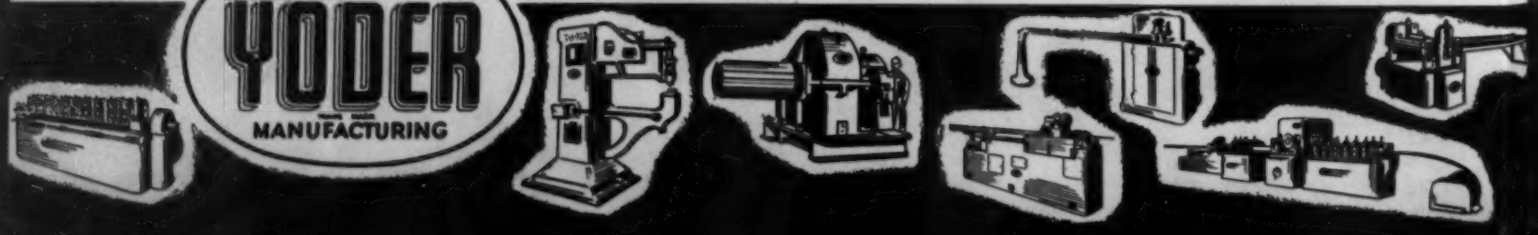
Manufacturers using tubing or parts made of tubing should be interested in a Yoder Tube Mill. Write for information.

The mill pictured will produce tubing up to 4" diameter by 3/16" wall. Other standard mills available to make pipe and tubing from 1/4" to 26" diameter.

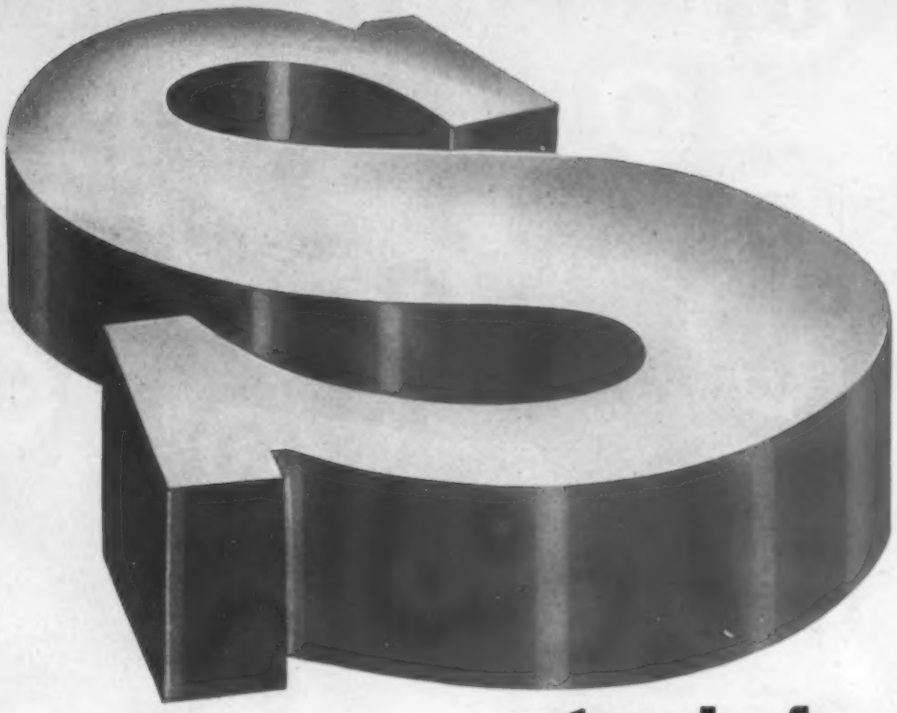
THE YODER COMPANY, CLEVELAND, OHIO, U. S. A.

METAL • FORMING • PRODUCTION • MACHINERY

ENGINEERING
YODER
MANUFACTURING



IN QUENCHING OILS...



stands for—

✓SPEED

War-time steels require a *fast* rate of quenching to attain the necessary hardness. HOUGHTO-QUENCH provides a speedier quench, important to steels of lower alloy content when passing through the temperature range of 1300 to 900° F.

✓STAMINA

HOUGHTO-QUENCH has what it takes to stand up under continued use, month after month. It's made solely for quenching, is fortified in three ways—for wetting speed, heat absorbency and resistance to oxidation.

✓STABILITY

A very minimum of sludge formation; no fractional distillation of light ends. Retains the required physicals after long use. This stability is most important in vital war production which demands uniformity, heat after heat.

Developed as a result of 77 years of Service to the Metal Industries.
Ask the Man who uses it!

E. F. HOUGHTON & CO.

PHILADELPHIA

Chicago - San Francisco - Detroit

HOUGHTO-QUENCH

FAMOUS LIFE LINES

1 COASTAL CONVOYS, life lines of our East Coast and Caribbean water-borne transport, are guarded day and night by U. S. destroyers like this. Note the Navy blimp hovering protectingly over one of the tankers in the convoy.

Official U. S. Navy Photograph

2 BELL AIRACOBRAS—so-called "flying cannon"—in a dive. Many of the life lines of U. S. warplanes —primer tubes for engines, control tubes and air bleeder tubes for propellers, carburetor compensator tubing — are by Bundy.

Official Photograph, U. S. Army Air Forces

THIS IS a war of *little* things as well as big. On slender lines of tubing, for example, may depend the lives and fighting effectiveness of the men in tanks, jeeps, bombers, PT boats, destroyers.

Life lines of Bundy Tubing transmit hydraulic pressure for tank turrets and for all types of motor vehicles. They carry refrigerants to cold rooms of warships to chill both food and ammunition. They feed power boats, mine sweepers, tractors, Diesel engines with needed fuel and lubrication lines. They supply mechanical or structural tubing on radios, aircraft, gliders, tanks. And this is just a partial list.

We at Bundy are proud to assume the responsibility of seeing that these and many other forms of fighting equipment get the finest, most dependable tubing we can make. Bundy Tubing Co., Detroit, Mich.

U. S. ARMY EXPEDITIONARY GAS CANS, used by hundreds of thousands wherever there are gas-propelled military vehicles, tanks or aircraft, have their life lines—their air vent tubes — of Bundy Tubing.

Buy U. S. War Bonds — Get in Your Scrap

BUNDY TUBING

ENGINEERED TO YOUR EXPECTATIONS

BUNDYWELD double-walled steel tubing, hydrogen-brazed, copper-coated inside and outside. From Capillary sizes up to and including ½" O. D. This double-walled type is also available in steel, tin-coated on the outside, and in Monel.

BUNDY ELECTRICWELD steel tubing. Single-walled — butt welded — annealed. Available in sizes up to and including 2" O. D. Can be furnished tin-coated outside in smaller sizes.

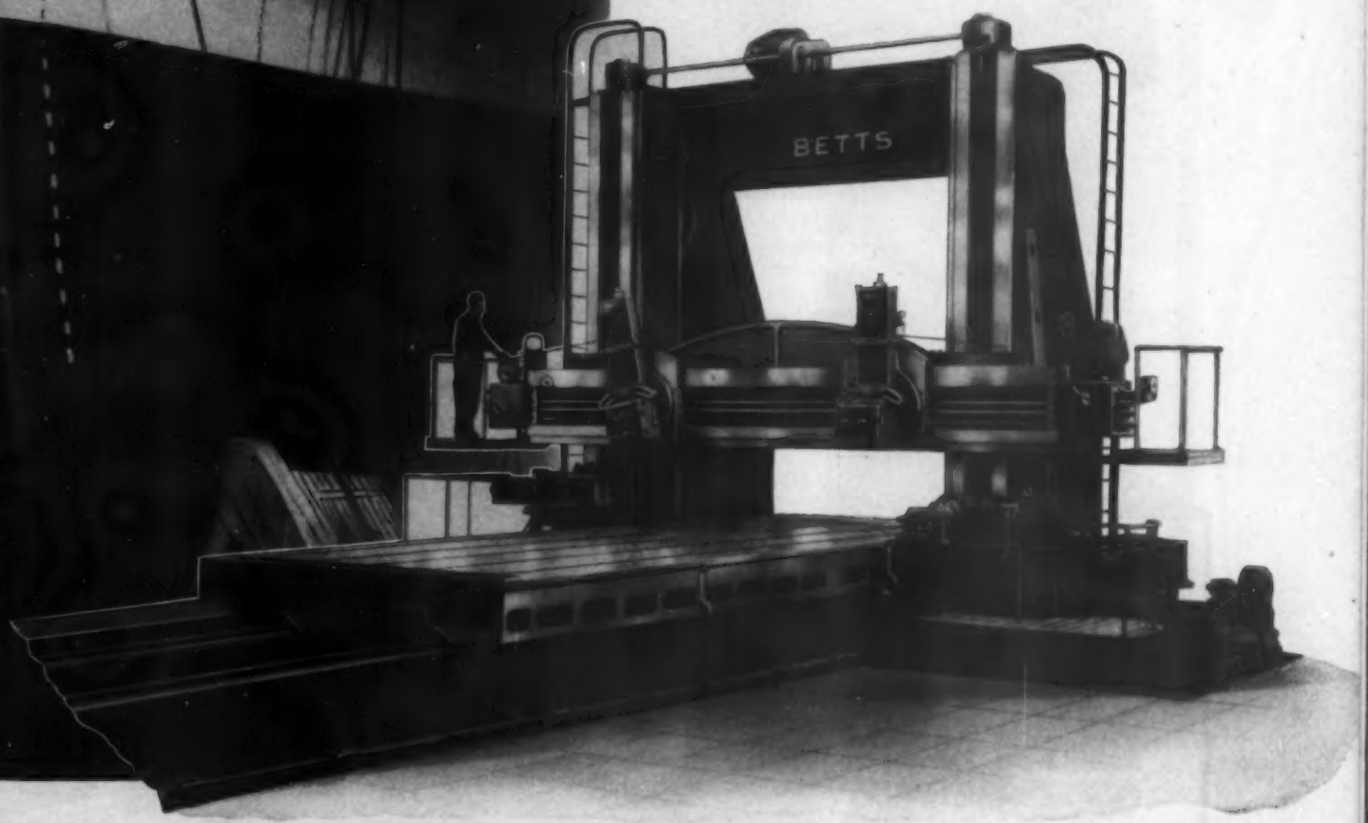
BUNDY "TRIPLE-PURPOSE" tubing. Double-walled, rolled from two strips, joints opposite, welded into a solid wall. Available in all Monel; all steel; Monel inside—steel outside; Monel outside—steel inside. Sizes up to and including 5/16" O. D.

Another Launching

Behind the launching of every large ship are hundreds of machine tools, each vitally important to produce at today's record breaking speed.

Here at Consolidated we have launchings too, of the machine tools for building ships. Large Betts Planers (among other Consolidated Machine Tools) in both government and private ship yards are helping to build the vessels for our wartime battle and cargo fleets.

These large Betts Planers have 3 ways to evenly distribute the work when the wide table is carrying extremely heavy loads. Ease of operation, accuracy and the ability to stand up under constant severe service are inherent qualities of Betts Planers. Simplicity of design coupled with rugged construction make them favorites wherever they are used. Possibly a Betts Planer could be used to advantage in your shop.



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CONSOLIDATED
MACHINE TOOL CORPORATION
ROCHESTER, NEW YORK

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LEVINSON STEEL SALES CO.

Warehouse and Specialty Steel Products

33 PRIDE ST., PITTSBURGH, PA.

Hot Rolled Sheets, Strips, Flats, Bands, Rounds, Squares, Hexagons; Bar-Sized Angles, Channels, Zees, Tees; Structural Angles, Beams, Channels; Plates and Checker Plates; Reinforcing Bars.

Distributors for APS Protected Steel
ROOFING • SIDING • FLASHINGS

LS LEVINSON STEEL

Production Doubled

...ON SHRINK FIT ASSEMBLY OF AIRPLANE LANDING STRUTS!

COMPANY NAMES STARTING WITH C*

increased production

Case Study from the Files of Deepfreeze

The Sub-Zero Method of Shrinking, Testing and Treating of Metals

*Name on request to bona-fide inquiries

Data and Part Information

Shrink-fit assembly of aircraft landing struts.

Diameter of bore—4.843" ± .002".

Diameter of mating part—4.843".

Deepfreeze metal chilling assures permanent assembly —reduces cost

These airplane landing struts, requiring a permanent shrink-fit, were formerly assembled in 20 minutes including heating time. This was done by heating the female part only.

With the installation of a Deepfreeze Cascade Industrial Unit, in conjunction with heating, the time has been reduced to 10 minutes—rejects minimized.

HOW IT'S DONE

The female part is heated in an oil bath at 450° F. and expanded .005". The male part is shrunk .003" in a Deepfreeze Cascade —120° F. Chilling Unit. The time in oil bath is 5 minutes—time in Deepfreeze 5 minutes. The cooling time to room temperature, in a jig, is 5 minutes—total 10 minutes. They are then inspected and wheel spindle must indicate within .003".

HOW DEEPFREEZE CAN HELP YOU...Deepfreeze sub-zero temperatures (as low as —120° F.) can help you in any one or all three of the following metal working operations:

1—Shrinking of metals for ease of bearing assembly, etc.

2—Testing of metals for reaction of sub-zero temperatures to aircraft instruments, etc.

3—Treating of metals for preventing growth or warp in gauges, etc.

FREE Additional Data *and proof of the outstanding success of the Deepfreeze method for chilling metals are included in this booklet. Write for your copy today.*

REQUIREMENTS

To obtain a *permanent* shrink-fit assembly of airplane landing struts.

DIFFICULTIES

Former method by heat only, unsatisfactory—could not hold even temperature. Too many rejects requiring pulling apart or disassembly.

Other Difficulties . . .

Dry ice was too costly, took too much time to crack and prepare...would not handle present production requirements.

SOLUTION

The Deepfreeze Cascade —120° F. Unit used in combination with an oil bath for mating part, meets every requirement, doubles production.

SAVINGS

In addition to savings in time, new method saves approximately $30.00 per day—cost of dry ice.

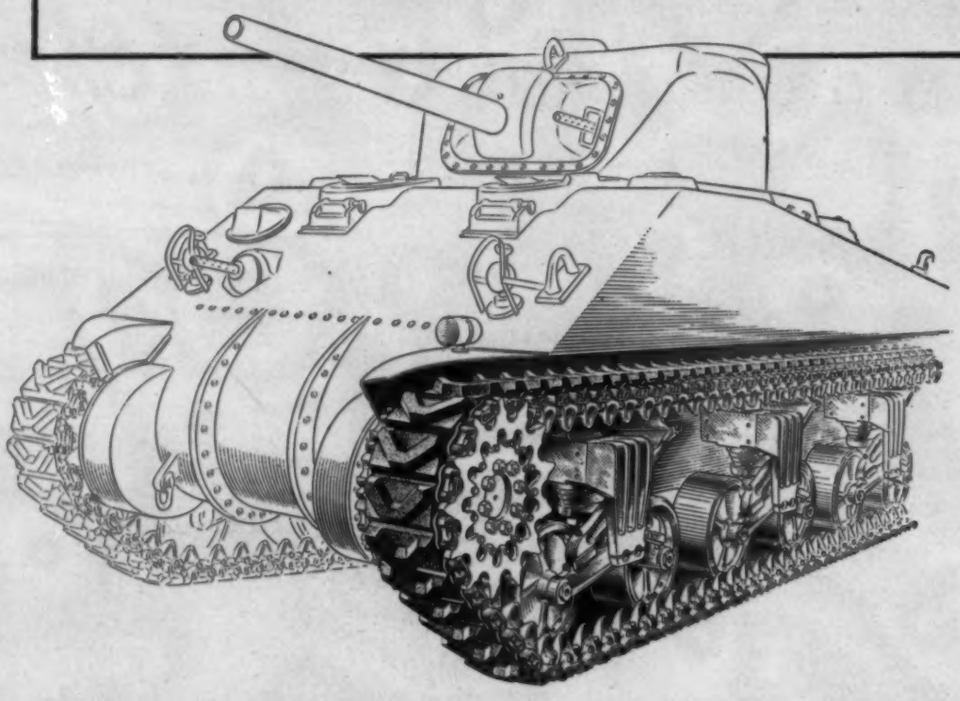
Deepfreeze

DIVISION

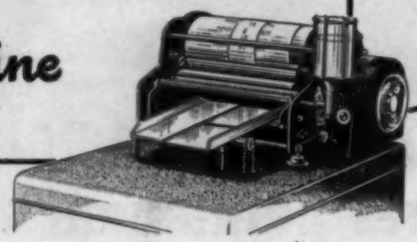
MOTOR PRODUCTS CORPORATION

2309 DAVIS ST., NORTH CHICAGO, ILLINOIS

the Tank took a hint from



the Duplicating Machine



THERE'S NO maintenance man in most offices, making regular trips with a grease gun to see that bearings have plenty of lubrication. That's one of the reasons why builders of business machines selected the Torrington Needle Bearing to lengthen the service life of their products.

With Army tanks, of course, it's entirely different. They're regularly and thoroughly inspected by highly skilled maintenance crews. But when a tank comes back from the battlefield, and the crew starts racing against time to get it ready for another lightning dash against the enemy, there's a big advantage in having bearings that seldom need attention. So the tank designers, like the business machine builders, turned to the Torrington Needle Bearing because its high load capacity helps prevent overloading or breakdowns, because its simple, effective system of lubrication allows the bearing to run for long periods without *any* attention at all. And its ready availability helps speed the job of tank production.

WHEN YOU PLAN YOUR POST-WAR DESIGNS, here's something to think about. Your peacetime customers will probably be looking for products that last longer, need less attention, work more efficiently—and the Needle Bearing can help you give them what they want. You will find a long list of typical Needle Bearing applications in Catalog No. 110. One of them may give you an idea for your own product—and Torrington engineers will be glad to help you work out the details.

THE TORRINGTON COMPANY

Established 1866 • Torrington Connecticut, U. S. A.

Makers of Needle and Ball Bearings

New York Boston Philadelphia Detroit
Cleveland Seattle Chicago San Francisco
Los Angeles Toronto London, England

TORRINGTON NEEDLE BEARINGS

KEYED TO TODAY'S NEEDS

AND TOMORROW'S TRENDS

NEW! CLEEREMAN CATALOGS

WRITE FOR YOUR COPIES TODAY!

CATALOG No. 400

CLEEREMAN DRILLING MACHINES

For high-speed drilling, boring, and tapping. Sliding head, round and box column types, in 21", 25", and 30" sizes. Wide range of speeds for drilling or boring 3/16" to 6" holes at proper peripheral velocity of tool.

CATALOG No. 300

CLEEREMAN JIG BORERS

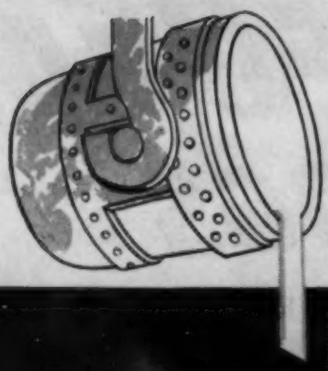
Constructed for extremely accurate production of jigs, tools, fixtures, dies, gauges, and precision machines. Extensively used for low-cost, small-quantity production of parts without the use of jigs and fixtures.

Cleereman now flies the Army-Navy "E" Flag

BRYANT MACHINERY & ENGINEERING COMPANY

Associated with **CLEEREMAN MACHINE TOOL COMPANY**

General Sales Offices 400 W. Madison St. • • Chicago • Ill. • U.S.A.



Weirton Steel

. . . and *submarines*

To build submarines, our shipyards need steel. Weirton's throbbing mills and alert workmen are supplying that steel—faster than ever before.

The uniformity and high quality of steel from Weirton is vitally important to all steel-users, in war and peace. "Double-control" by Weirton's men and machines, at every step in the manufacturing process, produces steel that meets the most exacting requirements.

Weirton Steel is pledged to maintain its standard of high quality—and to supply more steel for Victory.

WEIRTON STEEL COMPANY

Weirton, West Virginia

Sales Offices in Principal Cities

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NATIONAL STEEL CORPORATION

Executive Offices · Pittsburgh, Pa.

LADISH

quality

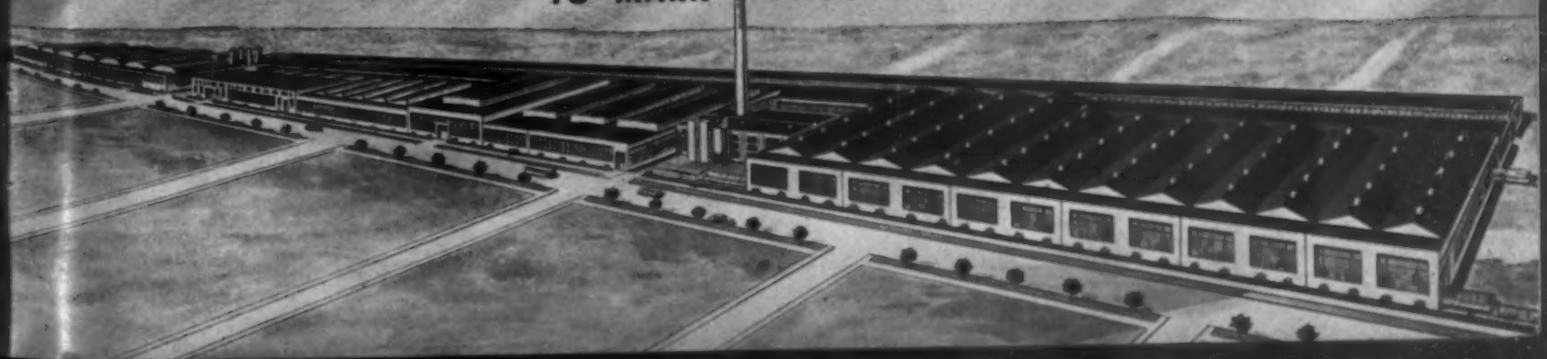
DROP FORGINGS

ON EVERY BATTLEFRONT

LADISH DROP FORGE CO.

PLANT AND GENERAL OFFICES CUDAHY . . . WISCONSIN

TO MARK PROGRESS



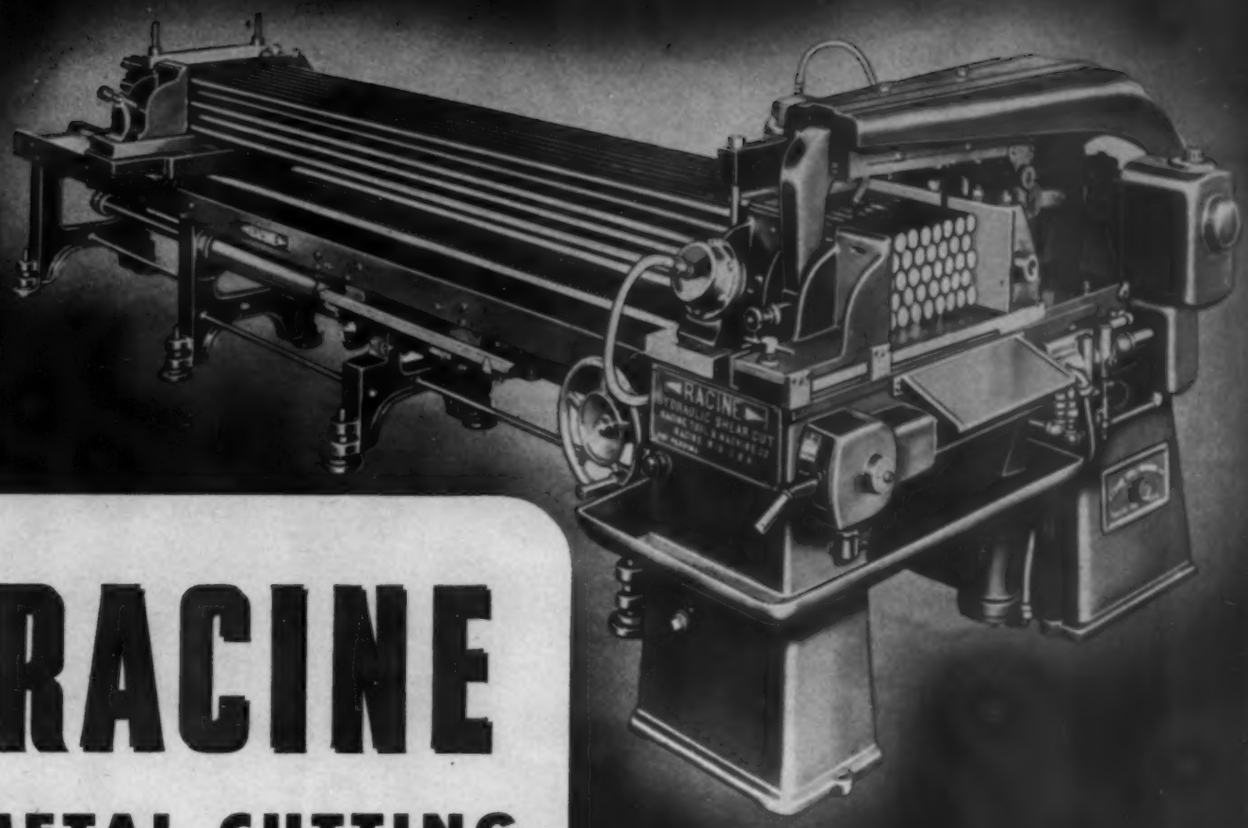
This shape is rolled from Alcoa Aluminum Alloy sheet in a single operation. Its use may take the place of a thicker extruded shape, thereby releasing metal and extrusion presses for production of vital war materials. Its producer is one of many companies who are roll-forming similar aluminum-sheet shapes.

Many of these rolled-sheet shapes, being produced today for war products, are made of heat-treated aluminum alloys to give them high strength. Often, the "as-rolled temper" strip is fed right from the heat-treating furnace to the forming rolls, before the metal can age-harden, thus avoiding distortion that might occur if heat treatment followed forming.

Also shown above, in silhouette, are other rolled-sheet shapes. It doesn't take much stretching of the imagination to visualize a great variety of these aluminum shapes used in numerous products. Exactly the right thickness and shape for strength and stiffness, but no more metal than is actually needed.

The economies possible with large quantity production are certain to cause these aluminum rolled-sheet shapes to be adopted widely for all kinds of postwar applications. ALUMINUM COMPANY OF AMERICA, 2112 Gulf Building, Pittsburgh, Pennsylvania.

ALCOA ALUMINUM



RACINE

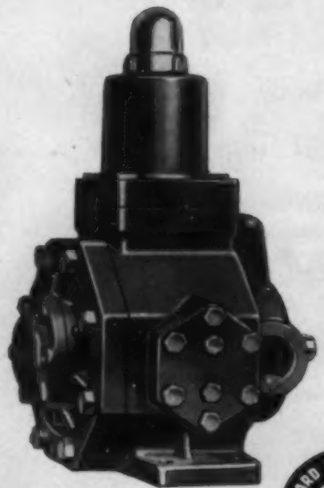
METAL CUTTING MACHINES

Standard for Higher Quality and Greater Precision

THESE Hydraulic Fed and Controlled Metal Cutting Saws with oil cushioned operation save blades, permit faster cutting and heavier cutting feeds. Designed and built for modern production—cutting time and costs can now be accurately determined.

Modern designing of Racine saws produces these outstanding features. Hydraulic control allows complete range of feeds—positive progressive and self-compensating progressive. Single lever control—inexperienced help can operate. Extra heavy pivot shaft and wide pivot bearing construction in arm of Saw Guide prevents cocking or binding strain in bearings and ways.

Racine's complete line includes models for general purpose and production cutting in a wide range of prices and sizes. Capacities 6″ x 6″ to 20″ x 20″. Automatic Stock Feed Machines, as illustrated, are also available.



RACINE *Variable Volume* HYDRAULIC PUMPS

A Modern Source of Hydraulic Force

Speed up the production of your power operated equipment with Racine Variable Volume Oil Hydraulic Pumps and Valves.

Pressure from 50 to 1000 lbs. per sq. in. for holding, pressing, clamping, feeding and forming operations.

No relief valve needed. Pumps only the amount of oil you require to do the job. Exclusive "Vane Type Variable Volume" feature. For vibrationless action in modern machine design. Capacities 0-12, 20 and 30 gal. per minute.

Four-way Hydraulic Valves are available with stem, lever, roller, latch, foot treadle and solenoid operating devices. Various porting arrangements can also be furnished to suit your requirements.

Racine's exclusive "Sleeve Type" Hydraulic Valves have balanced pistons. Made in ⅜″ to 1½″ standard pipe sizes. Continuous bearing and sealing surface—piston cannot sag—always in alignment—insuring longer valve life.

Our Engineering Department will be glad to help you work out your hydraulic application problems. Address your request for complete information to Dept. S.

RACINE TOOL and MACHINE COMPANY

STANDARD FOR QUALITY AND PRECISION

RACINE, WISCONSIN · U. S. A.

to provide for the common defense,
promote the general Welfare,
and secure the Blessings of
Liberty to ourselves
and our Posterity

Style 12

KENNAMETAL* REPRESENTS MORE THAN ITS INGREDIENTS

★These strong, hard and efficient steel-cutting tools required in their making more than merely the material ingredients.

Another essential ingredient was the protection and encouragement guaranteed under the Constitution of the United States of America to all citizens, including the men and women who make these tools.

The Constitution also provided for the establishment of a patent system to secure to inventors, for a limited time, the exclusive right to their discoveries, and it was in reliance upon this encouragement and guarantee that, from 1936 to 1938, Kennamental was invented and perfected by the founder of McKenna Metals Co., as described in U. S. patents.

It is also because of provisions in the Constitution which guarantee freedom of trade that it is possible to introduce and sell Kennametal to machine shops in every state in the Union, as well as to those in allied countries.

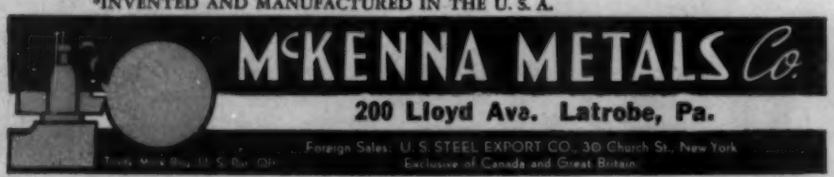
American citizens are free because our form of government is based upon a Constitution which includes the Bill of Rights, and which provides for the making of laws by representatives in the Congress whom we elect.

We are proud in the knowledge that, in this national emergency, we have added strength to our country, and have made possible the more rapid production of arms.

That this new tool material was developed at this critical time was providential, but it would not have been possible without initiative which is characteristic of free men, and the independence of action guaranteed them by the Constitution.

The Constitution
The Constitution of the United States separates the powers, the rights, and the freedoms of the legislative, judicial, and executive branches of the government.
Article I
Section 8, Clause 8
The first article of the Constitution proper preserves the property rights of inventors stating—"To promote the general welfare . . . . . to promote the progress of science, by securing for a limited time to inventors the exclusive rights to their discoveries."
The Bill of Rights
The Bill of Rights, composed of the first ten articles of amendment, preserves the specific rights and freedoms of the American people as individuals.

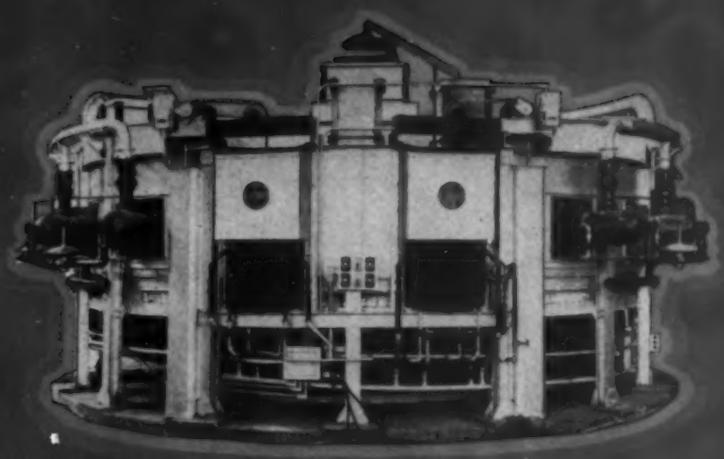
*INVENTED AND MANUFACTURED IN THE U. S. A.


McKENNA METALS Co.
200 Lloyd Ave. Latrobe, Pa.
Foreign Sales: U. S. STEEL EXPORT CO., 30 Church St., New York
Exclusive of Canada and Great Britain

HAGAN

Rotary Forging

FURNACES



GEORGE J. HAGAN COMPANY
PITTSBURGH, PA.

FACTS!

THIS NEW FURNACE PUBLICATION WILL BE OF REAL INTEREST AND VALUE TO EVERY FORGING PLANT EXECUTIVE INTERESTED IN MORE UNIFORM CONTINUOUS HEATING OF STEEL BILLETS.

YOUR COPY WILL BE GLADLY SENT ON REQUEST

GEORGE J. HAGAN CO.
PITTSBURGH, PA.

Detroit · Chicago · Los Angeles · San Francisco

What ever happened to the Horse Collar Market?

Who won the World Series in 1935? Who was vice-president under Harding? Of 1481 makes of American automobiles, 16 are known today. How many of the *others* can you name? And what ever happened to the carriage wheel business, and where's the horse collar market?

People, products, markets and methods all succumb to *change* . . . and today that powerful factor of change is doing more to disrupt markets, create new products, and revise production methods than most businesses are even remotely prepared for!

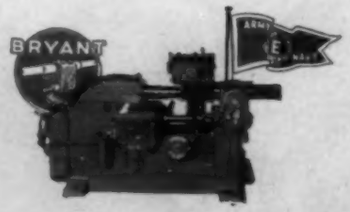
A soap company and a roofing company are operating shell-loading plants. Shipbuilders are building cargo planes. The automotive industry is producing farm machinery, locomotives, air conditioning equipment, and literally hundreds of other unrelated products. Manufacturers are this year spending hundreds of millions of dollars on research alone, and the day this war ends, a new age of production will begin.

Part of this story of change we know first hand, as only specialists can. That part is in the vital and highly specialized field of internal grinding . . . and this much we can tell you on the basis of our own experience with the amazing developments in production that we have seen and helped to produce:

If your business is manufacturing with metal, and if you are planning ahead today for the products you will manufacture tomorrow, the surest way to protect your business against failure from uneconomical production methods is to consult with the leading specialists in machine tool engineering.

Bryant's Consulting Service is available to you at all times. Call upon us now!

SEND FOR THE MAN FROM BRYANT



Bryant Chucking Grinder Company

SPRINGFIELD, VERMONT, U. S. A.

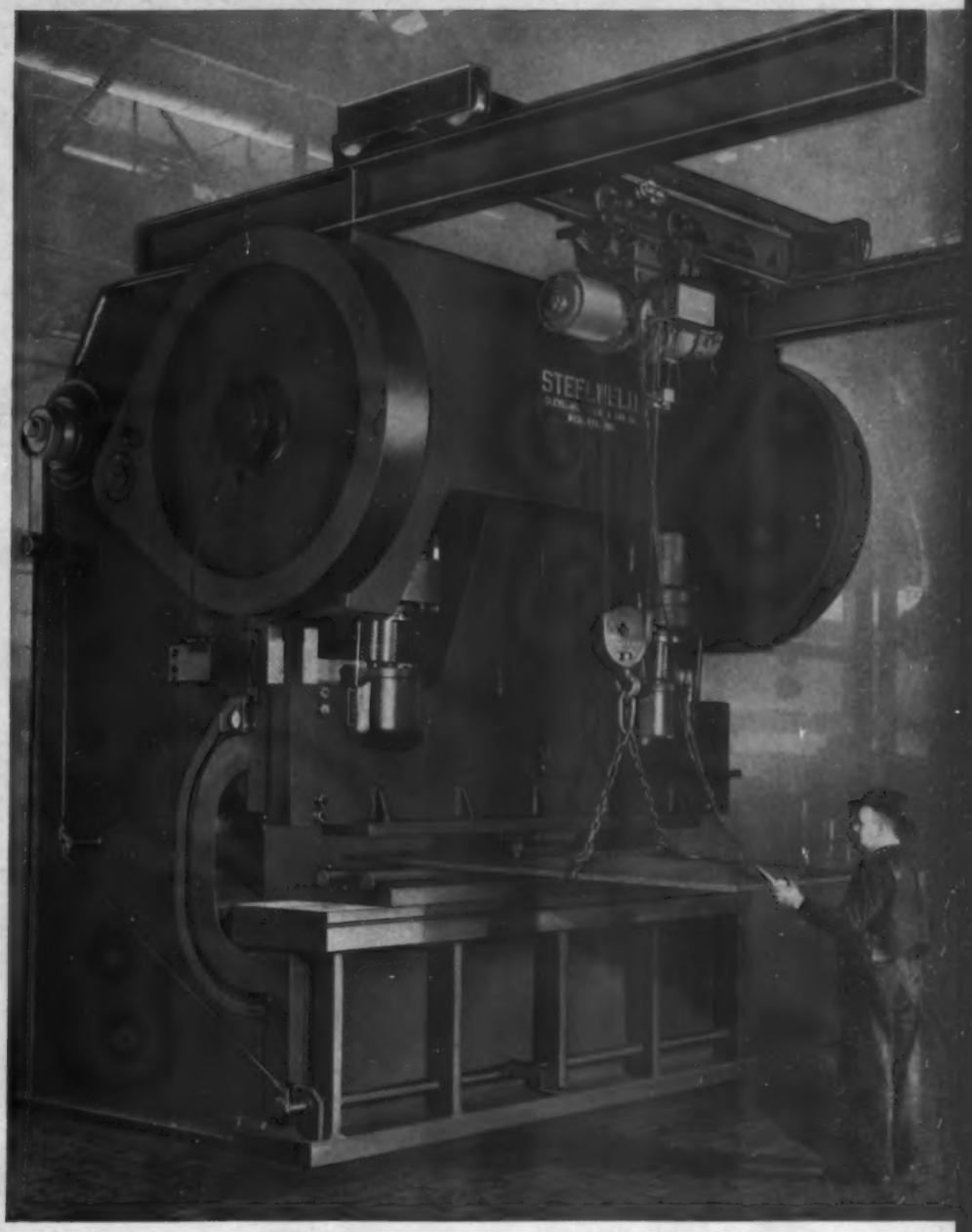
. . . CRANE-EQUIPPED PRESSES
for Heavy Bending and Plate Straightening

The handling of heavy plate being formed or straightened in bending presses often is a very serious problem. In some shops costly overhead cranes or other handling equipment is tied up a large part of the time with such work.

Some of the larger Steelweld Bending Presses are now being equipped with individual overhead traveling cranes which make it an easy task for an operator to handle heavy cumbersome plate in and out of the machine as well as to support it during press operations. The cranes are fabricated by Cleveland Tramrail and usually are hand-propelled with an electric hoist for the heavy lifting.

All Steelweld Presses now catalogued and nearly all older models now in service can be equipped with Cleveland Tramrail press cranes. The cranes are easily adapted to Steelwelds because all shafting is located at the rear of the machines away from possibility of being snagged and damaged by crane hooks, heavy plates, etc.

The application of individual cranes to presses is just one of many features pioneered by Steelweld to make press operation easier, faster, safer and better.



Model Mo5-8 Steelweld Press. Normal capacity 500 tons. Equipped with especially wide bed top and ram bottom to accommodate dies necessary for plate straightening.

CATALOG No. 2002 gives complete construction and engineering details. Mail request for free copy on your company letterhead.

GET THIS BOOK!

THE CLEVELAND CRANE & ENGINEERING CO.
STEELWELD MACHINERY DIVISION
1125 EAST 283RD STREET • WICKLIFFE, OHIO.

MANUFACTURERS OF • CLEVELAND CRANES • CLEVELAND TRAMRAIL • STEELWELD BENDING PRESSES

STEELWELD
BENDING PRESSES

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Tool Conservation Begins in the Tool Crib

Photographs Courtesy Weatherhead Company, Cleveland, Ohio

WITH GAGES IT'S *System*

Before a gage is returned to the storage rack, it is thoroughly checked and inspected, and any adjustments or repairs needed are made or ordered.

Felt-lined individual compartments protect the gages from injury and provide a practical visual check on the gage stock.

Metal check method of issuing and card record of stock condition, with carefully trained attendant, assure positive control of entire gaging system. This "Tool Crib" is air conditioned.

Well-equipped factories in mass production industries do not select their gages haphazardly or just by chance. Their gaging systems are completely integrated and adapted to their particular requirements. But no matter what a plant's gaging needs, all gaging systems should include at least three fundamental features:

1 **Adequate checking and measuring equipment**—gages need constant checking for significant wear, damage or tampering.

2 **Convenient, safe, systematic storage**—poor storage conditions can ruin gages even before they are used once, and a lost or misplaced gage means loss of valuable time as well.

3 **A positive accounting method**—when new gages are needed, they are usually needed badly, therefore proper accounting for every gage at all times avoids disruption of the gaging system through delays in anticipating requirements.

GREENFIELD TAP AND DIE CORPORATION
GREENFIELD, MASSACHUSETTS
DETROIT PLANT: 5850 Second Boulevard
WAREHOUSES in New York, Chicago and Los Angeles
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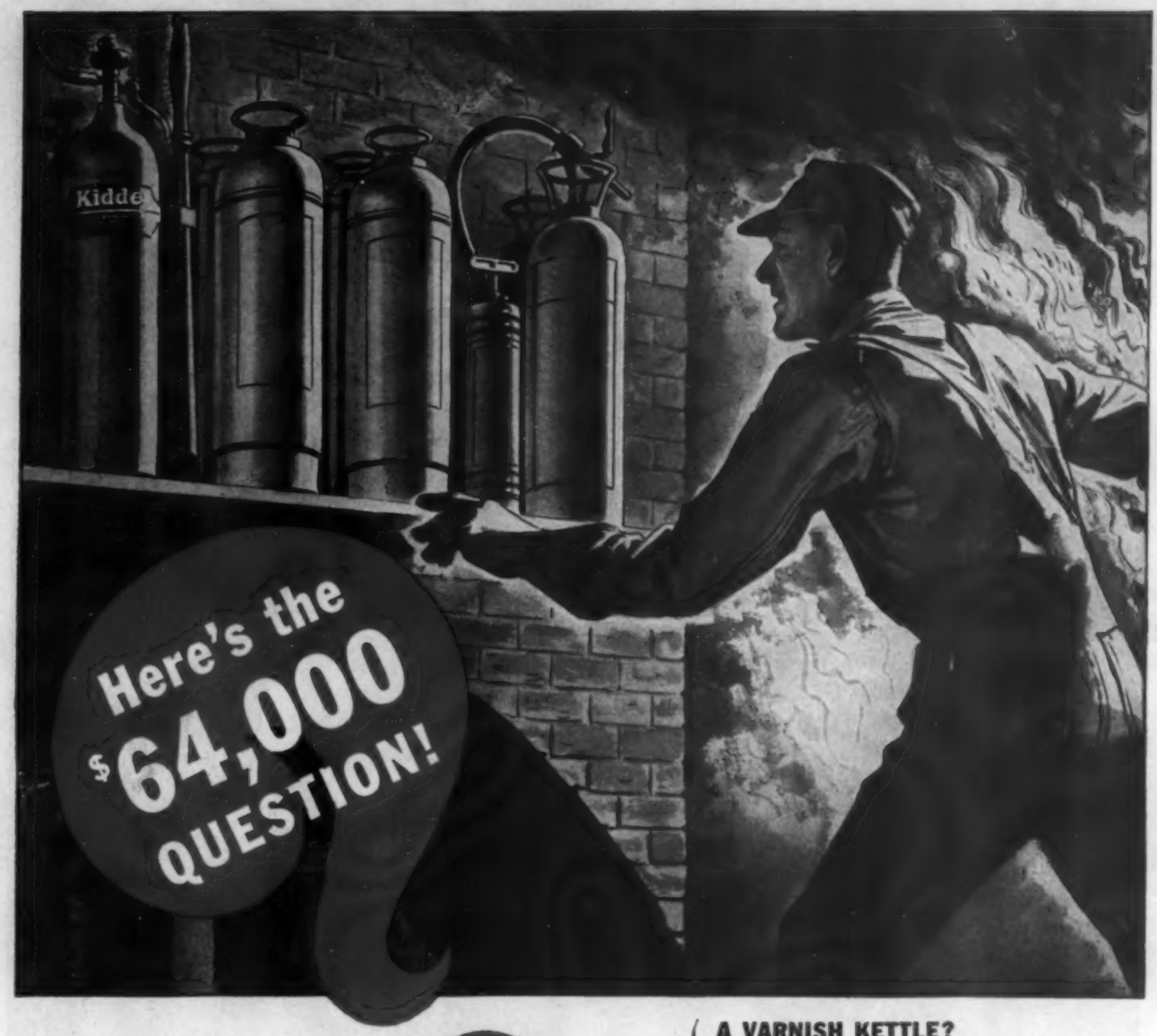
GREENFIELD TAP AND DIE CORP. OF CANADA, LTD., GALT, ONT.

ARMY E NAVY

GTD GREENFIELD

TAPS · · · DIES · · · GAGES · · · TWIST DRILLS · · · SCREW PLATES



WHAT FIRE-KILLER WOULD YOU PICK FOR FIGHTING A BLAZE IN . . .

A VARNISH KETTLE?
AN ELECTRIC MOTOR?
RUBBISH?
CARBON BISULPHIDE?
RUBBER CEMENT?

Get the wrong answer and it costs plenty! Fire can gain headway too fast, if you hit it with the wrong extinguisher.

All fires aren't alike. Neither are fire extinguishers. Special fire hazards call for special fire-fighting equipment. How are *you* fixed?

There's one easy way to tell. Look at the Underwriters' Laboratories' approval notice on your extinguishers. It will say something like "Classification A-2, B-2." The letters "A," "B" or "C" are what you are looking for. They tell if the extinguisher is OK for use on Class "A" fires (wood, rubbish, paper, etc.), Class "B" fires (flammable liquids) or Class "C" fires (electrical).

This simple check tells you if you have the right extinguishers standing guard beside your plant's varied fire hazards.

Kidde carbon dioxide extinguishers are for flammable liquid (Class "B") and for electrical (Class "C") fires. They snuff these blazes fast, smother them in a blasting cloud of snow-and-gas. Kidde carbon dioxide gas is one of the fastest known extinguishing agents.

Walter Kidde & Company, Inc.,
232 West Street, Bloomfield, N. J.

Kidde
HIGH PRESSURE GASES • FIRE PROTECTION
PROTECTS LIVES

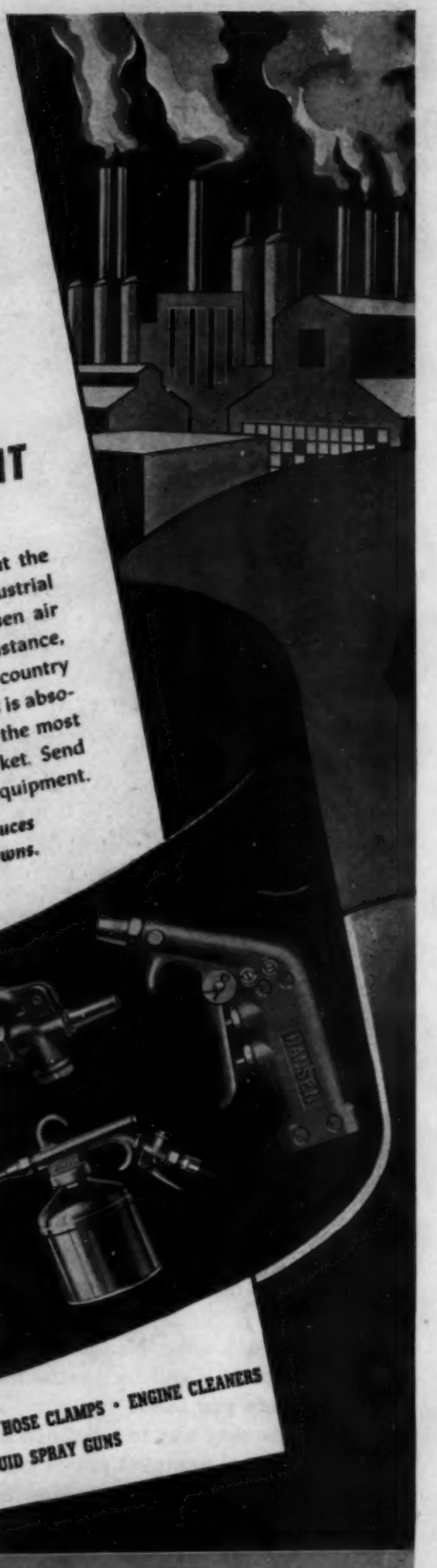
Power

BEHIND THE PRODUCTION

★

HANSEN

INDUSTRIAL *Air Line* EQUIPMENT



To-day's battle front encompasses not only the front line trenches but the front line of factory production. In thousands and thousands of industrial plants, aeroplane plants, shipyards, etc. throughout the world, Hansen air line equipment is playing a vital part in speeding up production. For instance, Hansen equipment is used in 90 per cent of the aeroplane plants in this country where speed, efficiency, economy, haste without waste or breakdowns is absolutely essential. ♦ The trend is toward air and Hansen manufactures the most complete, most advanced engineered air line equipment on the market. Send in for free catalog covering the complete Hansen industrial air line equipment.

Hansen equipment costs no more because it lasts longer, produces more with less effort and eliminates tieups due to breakdowns.

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AIR BLOW GUNS • SAND BLAST CLEANERS • AIR-LIQUID SPRAY GUNS

Hansen MANUFACTURING CO.
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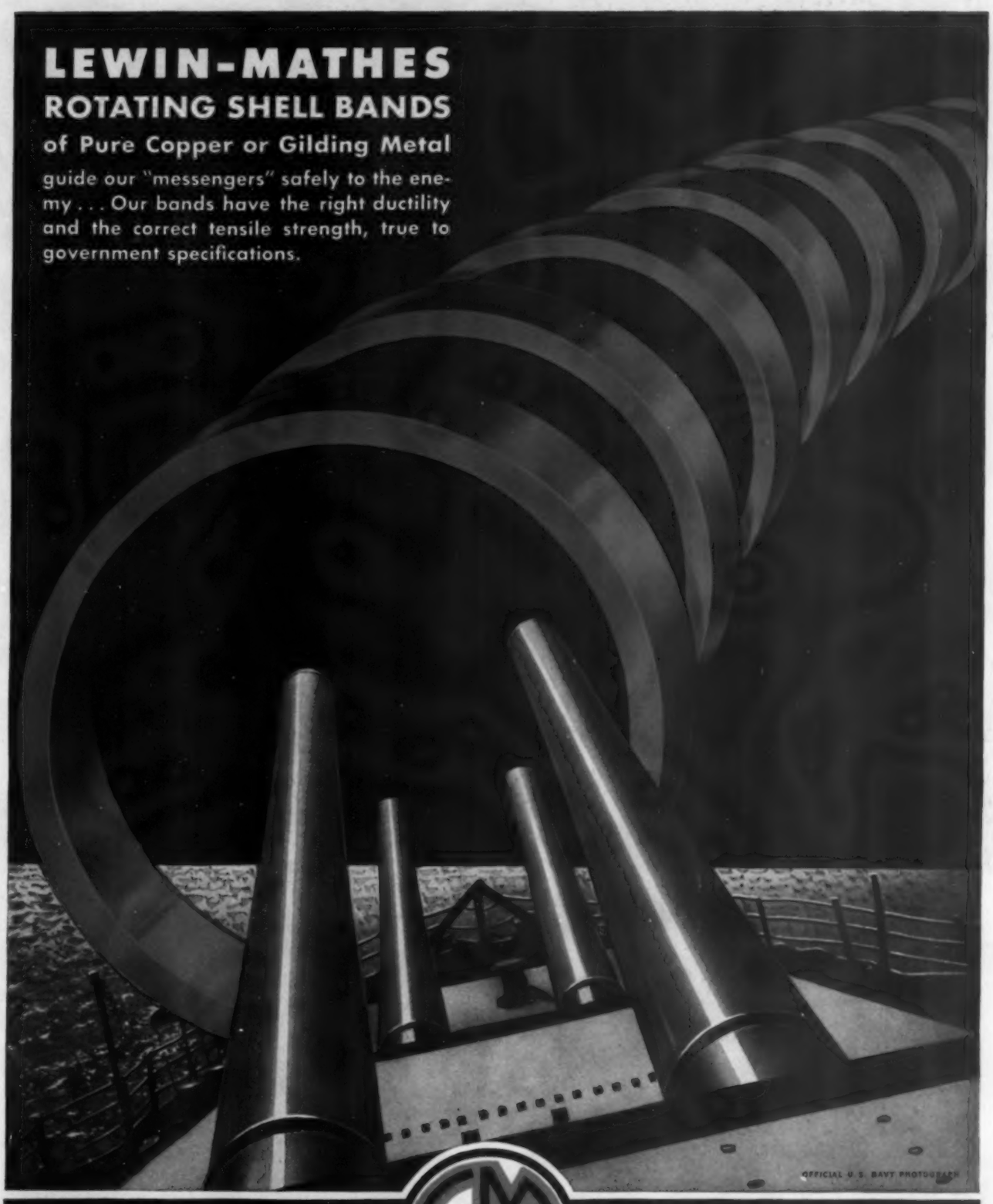
of Pure Copper or Gilding Metal

guide our "messengers" safely to the enemy . . . Our bands have the right ductility and the correct tensile strength, true to government specifications.



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Here at last....

An A-C ELECTRODE

IN ALL POSITIONS

THE GENERAL ELECTRIC ELECTRODE "W-26"

NOW through the development of the W-26 electrode you can extend the advantages and convenience of *high quality* a-c welding to all positions—both VERTICAL and OVERHEAD as well as flat and horizontal.

Developed by General Electric Welding Laboratories to meet the demands of industry, this a-c electrode complies with the following specifications:

- A.W.S. Filler Metal Specification E6011
- Navy Bureau of Ships, Specification 46E3, Grade 111, Class 1
- A.S.M.E. Boiler Code, Paragraph U68

X-RAY PHOTOGRAPH of weld made with the W-26 reveals high quality of deposited metal. Note the smooth, uniform appearance and complete absence of gas pockets, slag inclusion, and undercut.

OPERATING CHARACTERISTICS

In operating characteristics and quality of the finished weld, W-26 is superior to other all-position a-c electrodes heretofore available and is equal to the best direct-current electrodes used for mild-steel work. It provides a strong, forceful arc, free from magnetic blow, and enables operators to make finished welds with good fusion and excellent penetration.

PHYSICAL CHARACTERISTICS

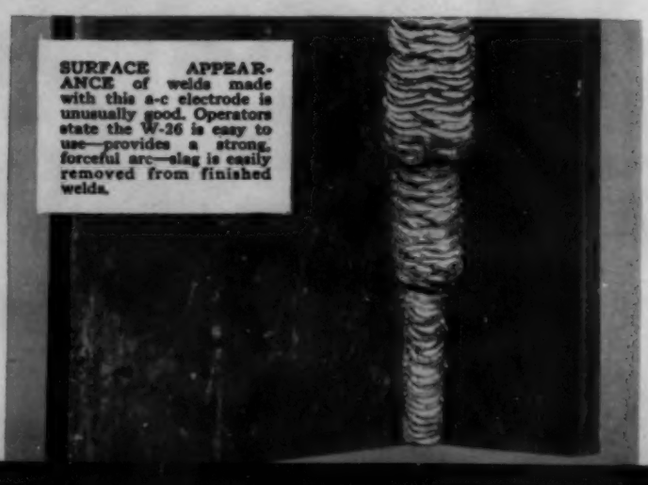
The following table reflects average results obtained from all-weld-metal specimens, tested "as-welded"

Physical Properties of Deposit	5/32-in. Diam	1/8-in. Diam
Ultimate tensile strength, lb per sq in.	72,500	72,000
Yield point, lb per sq in.	60,000	62,000
Elongation in 2 inches, per cent	25	25
Reduction of area, per cent	46	46

(The W-26 electrode is now available in 1/8 in. and 5/32 in. diameters. Other sizes, from 1/16 in. to 1/4 in. inclusive, will be made available as soon as possible.)

USERS to whom the W-26 has been submitted report especially favorable results. For example, Mr. R. Kraus, Welding Engineer of Stacey Brothers, Cincinnati, Ohio, says "—with these electrodes average welders can weld vertically and overhead at an equal output as with direct current and reverse polarity. This is a decided advantage for our type of work." Mr. E. H. Dunkman of the United Welding Co. reports "—this appears to be the best all-position a-c electrode we have ever tried—metal lays smooth with little or no undercutting."

For further information and samples of the W-26 electrode, get in touch with your nearest G-E arc-welding distributor or write your nearest G-E office. General Electric, Schenectady, N. Y.



SURFACE APPEARANCE of welds made with this a-c electrode is unusually good. Operators state the W-26 is easy to use—provides a strong, forceful arc—slag is easily removed from finished welds.

FIRST-CLASS WELDING in the overhead position is easily accomplished with the W-26 A-C electrode.

EXCELLENT PENETRATION with good fusion and flat contour is shown by this cross section of a weld made in the vertical position with the W-26 electrode.

TRAIN OPERATORS FASTER

with the new G-E training film

The INSIDE of ARC WELDING

This new training film, *in full color and sound*, covers all the basic principles of correct arc-welding technique. With it, welding instructors can train more operators *faster* and provide these important advantages:

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For both large and small classes alike

20% SAVING IN TIME—
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MORE EFFICIENT TRAINING—
technically correct in every detail

Wherever shown, this film has met with enthusiastic approval by educators and operators alike. To take full advantage of this helpful training aid *you will want to use it regularly as a permanent part of your training program.*

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each part 10 minutes and complete in itself. 16 mm.

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2. **Flat Position**
3. **Horizontal Position**
4. **Alternating Current—flat and horizontal**
5. **Vertical position**
6. **Overhead position**

YOU CAN BUY these films at print cost—only $52 per film; $312 for the set of six.

OR YOU CAN BORROW prints for a *single* showing. Just contact your G-E arc-welding distributor, or nearest G-E office, or mail coupon below:

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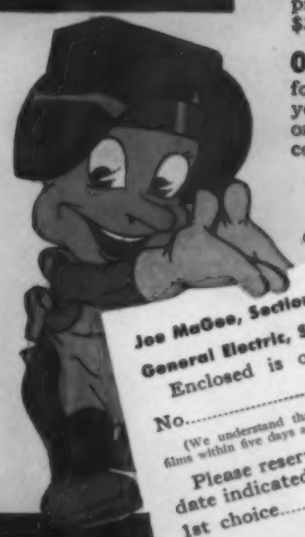

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General Electric, Schenectady, N. Y.

Enclosed is our order for the following films:

No.....

(We understand that if we are not completely satisfied we may return the films within five days and our order will be cancelled.)

Please reserve Film No.....for our use on date indicated. 1st choice..... (date) 2nd choice..... (date)

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.....(street address)

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673-4

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WHEELS & POINTS
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We are proud to be honored with the Navy "E", awarded for outstanding accomplishment in Defense production.
Brown & Sharpe Mfg. Co.
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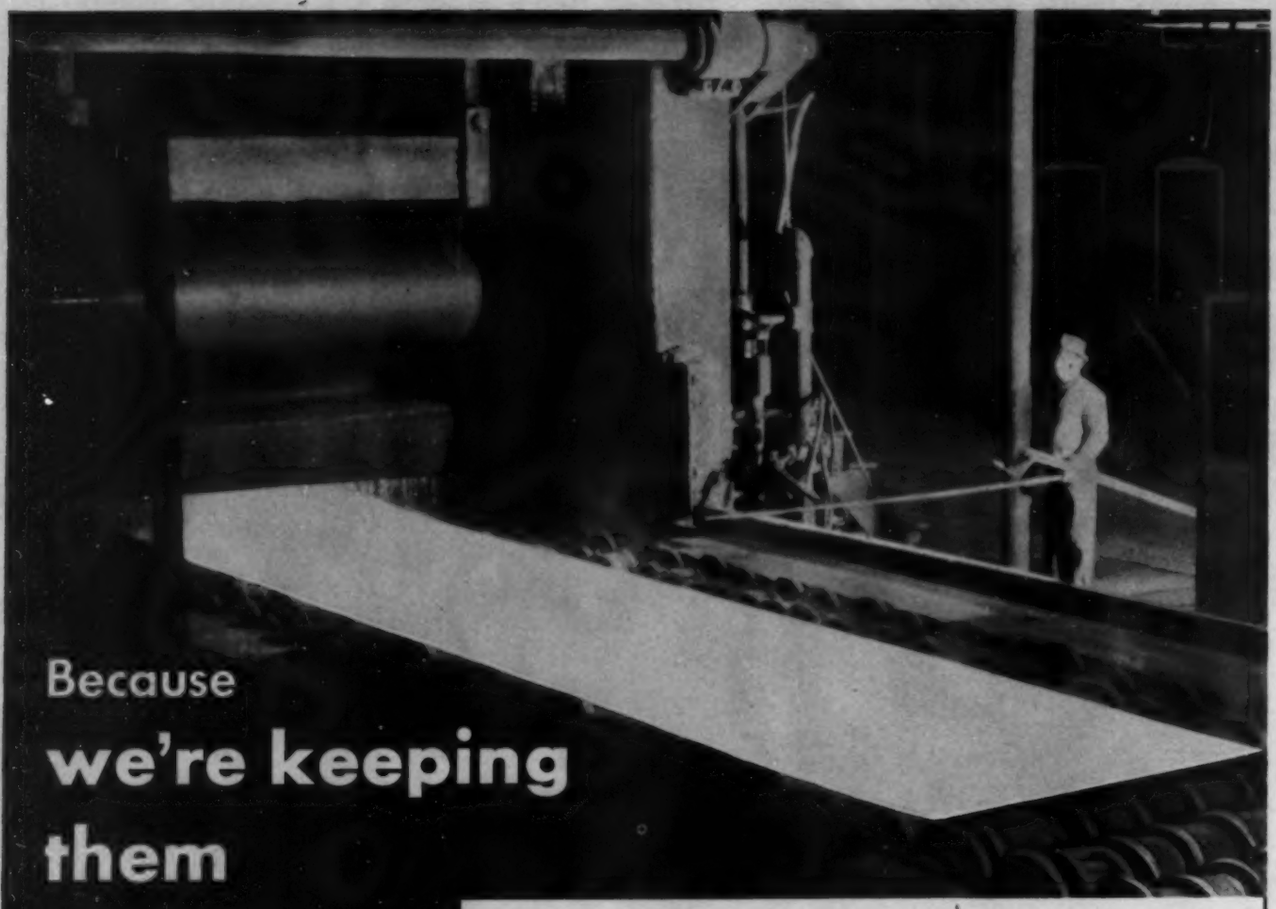
BS

BROWN & SHARPE CUTTERS



Because
we're keeping them rolling

at *record-breaking speed*

We're helping keep them rolling, too!

Though the greater part of our production is allocated to the requirements of the United States Navy . . . we are producing more than ever before in our history . . . and we are able to supply substantial tonnages of needed steel plates for the oil refining and synthetic rubber industries, whose vital products are powering every phase of our Victory drive.

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CLAYMONT, DELAWARE
MAKERS OF QUALITY
SHEARED STEEL PLATES—FLANGED & DISHED HEADS

WORTH

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For example, Calcium-Manganese-Silicon combines three powerful deoxidizing agents in one alloy, and is more effective as a scavenger and deoxidizer than separate alloys containing these elements. When it is used in the ladle, the fluid slag formed readily removes impurities, and leaves clean, sound steel. It improves the ductility of steel castings poured at high temperatures in green-sand molds, and can be used to replace part of the aluminum generally considered necessary in the making of these castings.

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Low-Carbon Alloys Save Time and Money in Steel Production — Low-carbon alloys, such as low-carbon ferrochrome and ferromanganese, offer a number of advantages over the higher carbon grades.

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Vanadium Improves Steel Castings — The addition of a small amount of vanadium, usually not over 0.10 per cent, to steel castings refines grain, materially raises the yield-point without sacrificing ductility, and greatly increases resistance to shock and fatigue. This is especially useful in engine and railroad car castings.

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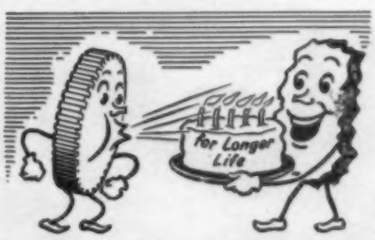

Write for This Booklet — If you want more information about these and the many other "Electromet" ferro-alloys and metals, their use, and the service that goes with their purchase, write for this 24-page booklet entitled "Electromet Products and Service."

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Ferro-Alloys & Metals

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PLANET

PURDY looks at steel products from the point of view of the men who have to "put them together" in the manufacture of fighting equipment. When ordinary methods or standard procedures can't get jobs done, Purdy men are ready to help "tear 'em apart," analyze the problem from a production standpoint, and recommend materials and methods that *work*—and the complete PLANET line of Spring Steels, Tool Steels, Drill Rod and Cold Drawn Steels is here to help them.

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A manufacturer, unable to get shim steel to finish urgently needed dies, put in a call to Purdy. Purdy men suggested using PLANET Blue Tempered Spring Steel as a substitute. It worked—and the dies went out *on* time! Whatever *your* Victory product, whatever its problem: in steel supply or application, or something demanding *extra* ingenuity in using steel—call on Purdy for quick service.

PLANET SPRING STEELS include:

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FLAT HIGH CARBON: Cold Rolled Annealed SAE 1095 Coils and Straight Lengths • Cold Rolled Annealed .70/.80 Carbon Coils and Straight Lengths • Blue Tempered and Polished Coils • Hot Rolled SAE 1095 Sheets • Hot Rolled SAE 1095 Sheets Annealed • Oil Tempered Flats.

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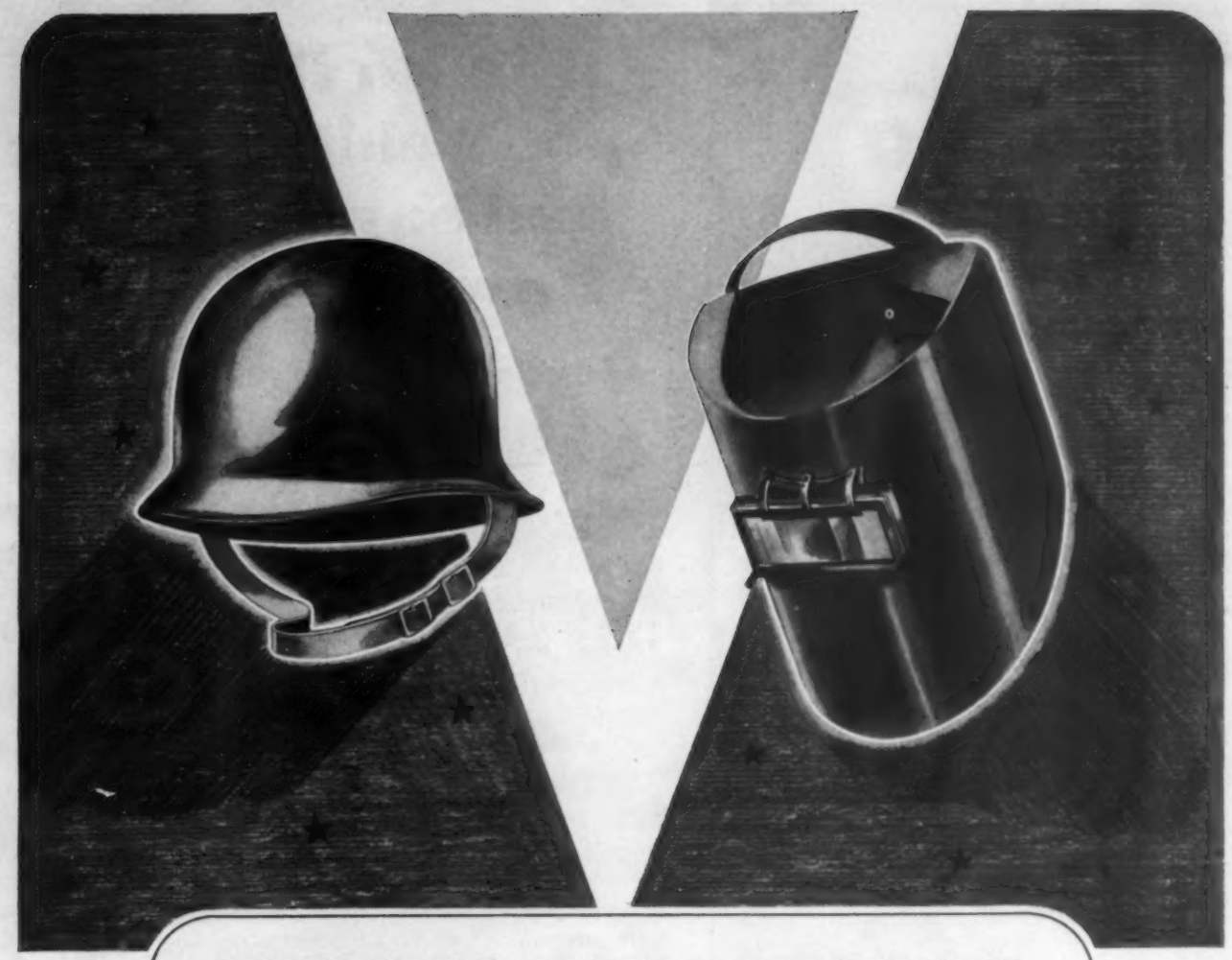
PURDY *War steels* PLUS *Know how*



WHAT THE WELL DRESSED MAN WILL WEAR *This Year!*

Helmets are the style again. On the firing line and the production line two-fisted men favor this Victory headgear. To the many new wearers of welder's helmets we would like to say a word on Champion electrodes.

Whenever you use Champions you may be sure of welds which will pass the most rigid inspection. Welds done better and in less time — welds uniform and smooth. There is a size and length for every job — use the largest practical size thereby saving vital critical materials. Be sure and burn them down to shortest stub end.

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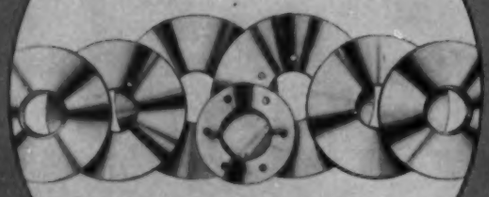
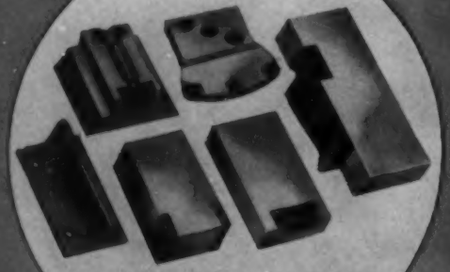
STANDARDIZED RESISTANCE WELDING ELECTRODES

SPOT WELDING TIPS AND HOLDERS



SEAM WELDING ROLLS



FLASH, BUTT, PROJECTION WELDING DIES

Speedier Production
Less Down Time
Better Welding
Lower Cost

How to Dress Spot Welding Tips and Save Vital Raw Material

You'll save production time and conserve essential raw materials . . . do a better resistance welding job, too . . . by insisting that spot welding tips are dressed correctly in your plant. Here are some suggestions:

Three "Do's"

1. Machine Tips to Size on any small lathe having a suitable collet or quick-acting chuck. A day's supply of tips can easily and quickly be machined . . . and machining on a lathe is the best dressing practice.

2. To Dress Tips on the Machine . . . and thus avoid down time on a long production run . . . use the Mallory Tip Dresser illustrated above. This handy tool re-machines both upper and lower tips to the correct welding face, with no need for removing tips from their water-cooled holders. Or, if a flat tip is being used opposite a pointed or domed tip, the latter can be dressed by inserting a plate between the Tip Dresser and the flat tip.

3. Clean the Surface of electrodes at frequent intervals with a fine abrasive cloth. Use this cloth lightly and don't permit it to become contaminated with iron particles or other dirt that may "burn" the electrode.

A "Don't": In general, do *not* use an ordinary shop file to dress spot welding electrodes. Also, a clogged or dirty file will shorten electrode life by contaminating the electrode.

TECHNICAL DATA SPEEDS PRODUCTION! Selection of the best electrode materials, designs and cooling methods for spot, seam, flash or butt or projection welding . . . it's not easy . . . but the right answers in any specific application will certainly speed output. Mallory metallurgists and welding engineers can give you the right answers to your problems on resistance welding. They'll help you produce better welds, faster, at lower cost. Write today for specific data . . . and for your free copy of the useful 79-page MALLORY RESISTANCE WELDING DATA BOOK.

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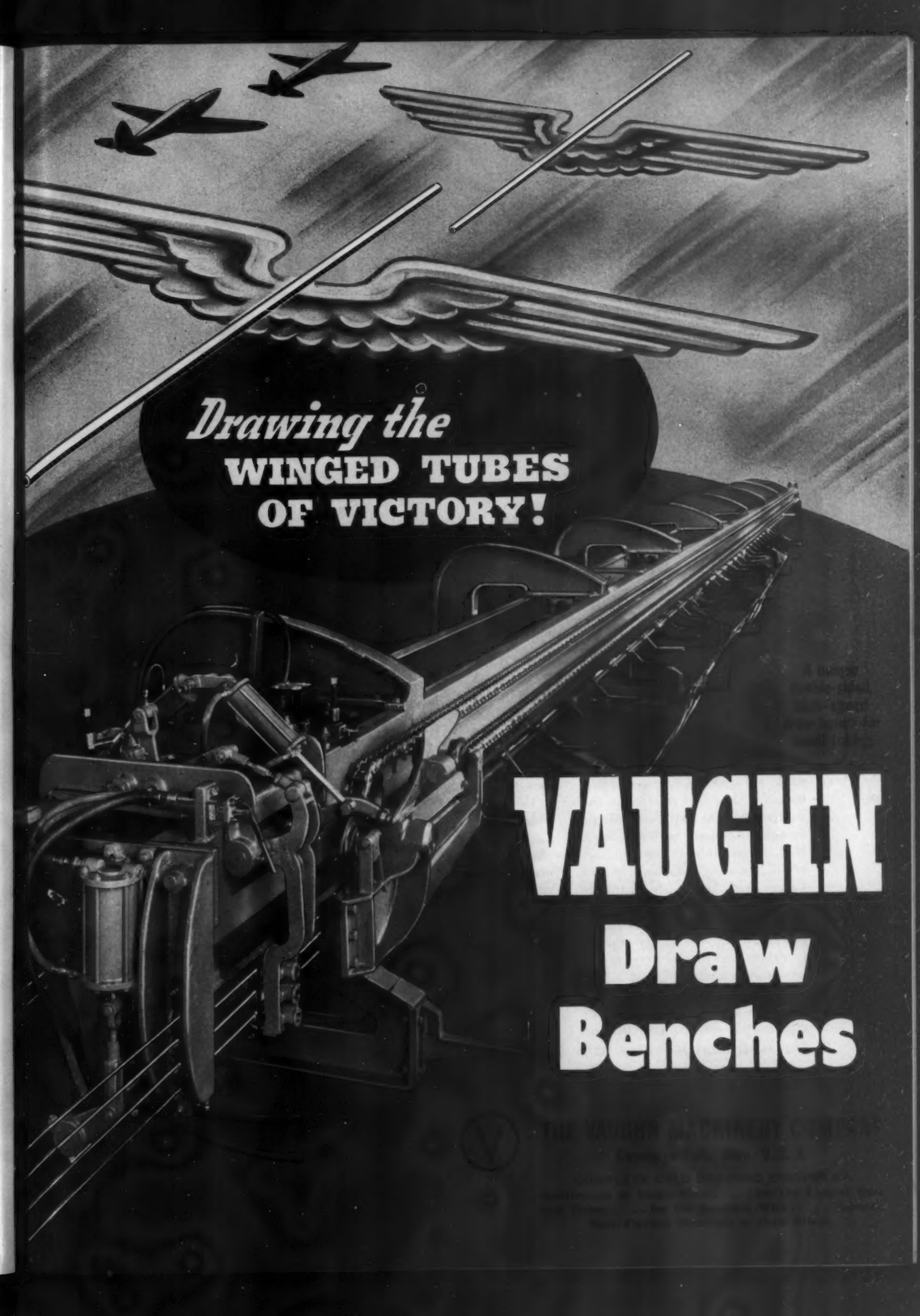
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WINGED TUBES
OF VICTORY!
VAUGHN
Draw
Benches

New Operators

TRAINED QUICKLY FOR HIGH PRECISION WORK

Chasing thread gage laps is one of the most accurate operations in gage work, yet within a few weeks after installing their first machine in this department, The Taft-Peirce Manufacturing Company of Woonsocket, R. I., is operating its entire battery of 16 Monarch Sensitive Precision Lathes with previously untrained help. In spite of this seemingly short training period, production rate is high, accuracy well within required tolerances, and the number of rejects surprisingly low.

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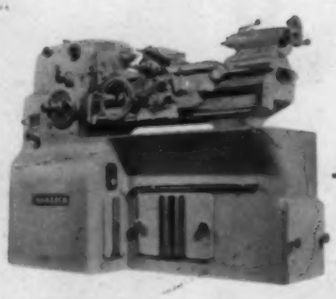
Further—this is additional proof that even under present production pressure, there is no letdown in Monarch quality.



THE MONARCH MACHINE TOOL COMPANY · · · SIDNEY · OHIO

MONARCH LATHES

COVER THE TURNING FIELD

Better grasp of specifications aids in substitution, conservation of materials. P. 88

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CONTENTS

Volume 112—No. 5 **STEEL** **February 1, 1943**

NEWS

OPA Ceiling on Iron Ore "Threatens Continuing Supply for War" ... 50
Lower Steel Earnings Reflect Tax, Wage Increases ... 53
Bethlehem Steel Co's. Taxes 7½ Times Net 1942 Earnings ... 54
Aid to Allies Tops 8 Billions; Get One-Third of Tanks, Planes ... 56
WPB Office of Power Director Established; J. A. Krug is Chief ... 57
More Subcontracting Must Be Done, Batt Tells "Clinic" ... 58
Priorities—Allocations—Prices ... 59
New War Department Building Nearly Mile in Circumference ... 65
England Maintains Essential Steel Output After 39 Months of War ... 67
Plan for Merger of Consolidated-Vultee Aircraft Companies ... 76
Canadian Steel Strikers Return on "Truce" with Government ... 77
Labor-Management Committees "To Live Long After War" ... 77
Buffalo Steel Plants Hire More Women ... 78
Army-Navy Awards ... 79
Men of Industry ... 80
Obituaries ... 81
Meetings ... 82

FEATURES

Behind the Scenes with Steel ... 4
Highlighting This Issue ... 47
Editorial—Casablanca Blueprints ... 49
Windows of Washington ... 60
Mirrors of Motordom ... 69
Wing Tips ... 72
The Business Trend ... 83
Industrial Equipment ... 118
New Business ... 156
Construction and Enterprise ... 158

TECHNICAL

The Women Mean Business ... 86
Function of Specifications in Conservation, Substitution ... 88
Defense Against Sabotage, Espionage Vital to War Effort ... 90
High-Speed Steel Tipped Tools ... 94
Electrical Developments in the Steel Industry ... 98
User Report No. 9 on Experience with NE Steels ... 100
"Warspeed" Erection Shortcut ... 108
Radio Tubes for Use in Heat Treating ... 111
Skid, Pallet Handling System ... 114

PRODUCTION

Steelworks Operations for Week ... 55

MARKETS

Steel Demand More Stable; Deliveries Still Deferred ... 139
Market Prices and Composites ... 140

Index to Advertisers ... 167
Where-to-Buy Products Index carried quarterly

SAVE BUYING TIME ON ELECTRICAL ESSENTIALS

by a Single Hour's Check-Up of the Graybar MM Plan*

Here's a plan that will help to mobilize the electrical supplies you need for war work with less difficulty and delay . . . a plan that can reduce the load on your purchasing department and plant engineers, saving office time and operating time.

THE FIRST STEP in the MM Plan is to sit down with your local GRAYBAR Man and review your anticipated needs and essential repeat purchases, rechecking your customary specifications in the light of what's likely to be obtainable in 1943.

THE SECOND STEP is to go over the "paper-work" now involved in obtaining estimates, ordering or compling with priority and allocation rules on electrical supplies. Almost invariably, GRAYBAR can put its experience to work to simplify compliance with necessary "red-tape", and to assure that deliveries are not held up because priority papers must be sent back for correction.

THE THIRD STEP is to consider how GRAYBAR'S local warehouse and delivery facilities can tie-in more closely with your receiving department and stock-room operations. This may save space you badly need, eliminate trans-shipments and rehandling.

THE FOURTH STEP is to review the opportunity for relieving the load on your contractor or engineering staff by using GRAYBAR Specialists in planning lighting, signaling, power distribution or other electrical applications.

ONE HOUR spent with your GRAYBAR Representative "dovetailing" this all-inclusive electrical supply service to your future needs may save hundreds of precious man-hours later on. Why not call GRAYBAR now for details on this MM Service?

Your local GRAYBAR *Representative is the key man in this plan: He puts his experience as a Materials Mobilizer to work "dovetailing" your essential electrical needs with the available production of more than 200 manufacturers.*

***Serving as Your MATERIALS MOBILIZER**

. . . on electrical supplies, GRAYBAR makes its procurement experience a part of your war production facilities. In an emergency, GRAYBAR men at more than 80 points throughout the country will attempt to locate and bring together what you need to keep war production moving, to the full extent that priority and allocation regulations permit.

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IN OVER 80 PRINCIPAL CITIES

Everything Electrical . . . . THAT IT TAKES TO WIN!

HIGHLIGHTING

this issue of STEEL

SAFETY Warning was served upon industry last week that unless it solves the problem of accidents the government will have to intervene (p. 77). Industrial accidents last year caused 94,000 deaths and 4,000,000 disabilities. This is too much when it is a proven fact that through proper emphasis on safety the number of accidents can be sharply reduced. Apparently many manufacturers still have a long way to go with their safety work. . . Large manufacturers are urged by William L. Batt to subcontract more of their war work so as to keep smaller manufacturers in existence; failure to maintain these smaller interests, he says, will hurt the postwar economy (p. 58).

IN THE NEWS If Congress accepts recommendations that have been made by the armed forces war contractors will not be subject to renegotiation unless their contracts involve more than $500,000 instead of more than $100,000 as at present. Also, they would not be subject to renegotiation if their contracts involved raw materials, or standard commercial articles ordinarily sold for civilian consumption, and articles used for general operation of a contractor's plant (p. 79).

Great progress continues to be made in the field of aviation and a number of new airplanes incorporate vastly improved features (p. 72). Incidentally, directors of Consolidated Aircraft Corp. and Vultee Aircraft Inc. have recommended merging of these two companies (p. 76)

STEEL describes what many people have hailed as the "eighth wonder of the world," the Army's new Pentagon building at Arlington, Va. (p. 65).

Lake Superior mine operators believe iron ore prices should be advanced, at least for the higher-cost properties (p. 50).

PRIORITIES Manufacturers are reminded that applications for allotments under the Controlled Materials Plan must be filed by Feb. 9 (p. 64). They are urged to fill in the CMP-4A and 4B forms promptly. . . An additional 50,000 tons of bessemer steel has been allocated by the War Production Board for the manufacture of new farm machinery in the first quarter, raising the total from 137,000 to 187,000 tons. . . Use of alloy steel in angledozers and bulldozers has been prohibited. . . Shortages of oxygen and calcium carbide are feared in the early part of 1943; the situation will depend on the speed with which plants now under construction are placed in production (p. 70). . . Construction projects involving more than a billion dollars have been halted to free materials, equipment and other resources for war production (p. 79).

POSTWAR PLANNING Next to winning the war, no questions are more important to men in industry than: "Will I be in business after the war?" and "Will I have a job after the war?" Hence postwar planning is a subject of vital interest to everybody. It has been said that chaos awaits us if we fail to emerge from the war without plans, both as a nation and as individuals. In Windows of Washington this week appears the second in STEEL's series of discussions on postwar planning (p. 60). A feature that deserves special attention is that our postwar plans, as already set up in large degree, spring not from the minds of theorists but in large measure of men who run a business and meet a payroll.

TECHNICAL George R. Reiss tells how Truscon Steel Co. is using several hundred women as welders in war production work with complete success (p. 86). Only one out of every 100 applicants fails to have the necessary aptitude and ability, states one company official.

The important place of specifications in conservation and substitution in our war economy is detailed by Professor Macconochie (p. 88) in the first section of a two-part presentation on war department specifications. A better knowledge and understanding of government specifications by industry will go a long way to facilitate war production, it is believed.

A most significant contribution to help relieve the shortage of high-speed steel tools is the method of building up composite tools from SAE-1045 shanks and broken high-speed steel parts as described by Carl B. Ericson (p. 94). Welding and heat treating is accomplished by a continuous heating cycle without allowing the work to cool. Tools so made outwear solid high-speed steel tools, he states.

F. Mohler, describing electrical developments in the steel industry during 1942 (p. 98), mentions the new semicontinuous plate mill now being built to include a 1250-horsepower scale breaker, a 4000-horsepower broadside mill, a 7000-horsepower reversing rougher, and four 5000-horsepower finishing stands.

A. S. Jameson presents No. 9 in the series of reports from users of the NE (National Emergency) alloy steels and describes work done with type NE-9420. Numerous charts afford an excellent opportunity for comparison of many AISI-SAE and NE steels (p. 100). Production of NE steels is increasing; in December the output was 225,000 tons (p. 55).

"Scrap" orders Frank Baker, general purchasing agent of Pullman-Standard Manufacturing Co., on his tour with L. C. Reed, chairman of the Chicago district dormant scrap campaign.

Mark it SCRAP—Mr. President

● So long as this war lasts the problem of scrap supply will confront America's steel mills. That is why we are again appealing to you presidents of manufacturing companies to use all your influence and all your official authority to move the dormant and potential scrap that remains about your plants.

Yes, we know you have had scrap drives, that you have had diligent scrap committees at work for months. They have done a fine job. But after all is said and done their authority is limited. Many of the things that can and should be marked scrap, under today's standards and necessities, are the very things which you, or other officials, may have designated only a few years ago as "standby," or "reserve." Maybe releasing some of this potential scrap is a matter of capital account. In any event it will require your countermand of old instructions, and orders from you to establish new company policies, so that surplus and unneeded machinery, spare parts, processed parts, etc., will reach steel mills as vitally needed scrap.

The next move is yours, Mr. President—mark it "scrap" today so our fighters will have the guns, the planes and the tanks they need to win.

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STEEL
February 1, 1943

Casablanca Blueprints

Most of the newspaper, radio and news magazine appraisals of the "unconditional surrender" conference at Casablanca stress the political and propaganda potentialities of the event and ignore a very practical service which it can render if the proper authorities follow through intelligently.

*The official communique issued by Messrs. Roosevelt and Churchill emphasized the fact that the conferees surveyed the entire field of the war, theater by theater, that "all resources were marshaled for a more intensive prosecution of the war by sea, land and air" and that "complete agreement was reached * * * * upon war plans and enterprises to be undertaken during the campaigns of 1943 * * * * with a view to drawing the utmost advantage from the markedly favorable turn of events at the close of 1942."*

This language is specific enough to warrant the supposition that the staffs of Messrs. Roosevelt and Churchill at Casablanca drew up detailed plans of war for the next 11 months. They must have a fairly complete set of blueprints of what is contemplated.

If this is so, then these blueprints should enable our government to clear up a number of questions which have caused considerable confusion in Washington since the 78th Congress convened.

There is the question of how big an army can be placed in the field effectively. The answer to this question holds the key to the allocation of manpower to industry, agriculture and other pursuits.

There are questions as to essentiality. Shall we continue to earmark critical materials for equipment for high-octane gas, or can we safely divert more tonnage to facilities for synthetic rubber?

Can we spare enough steel to provide more cars and locomotives for the hard-pressed railroads and to supply more machinery for the farmers?

Are we scaling down civilian economy too drastically?

These and other questions have been plaguing Washington officials and provoking attacks by Congress. The blueprints drawn at Casablanca should provide some exceedingly helpful answers.

E. L. Shaner
Editor-in-Chief

OPA Price Ceiling "Threatens Continuing Supply for War"

Lake Superior operators may ask increase to permit opening of marginal properties. Reserves of rich, easily mined material dwindling under emergency demands

STRONG representations for higher prices for Lake Superior iron ore are expected to be made this spring to the Office of Price Administration by mine operators. The appeal likely will be based on two factors:

1. Costs—freight, labor and taxes—have increased since present prices were established.

2. Production of the 100,000,000 tons of ore annually for a continuing war program will necessitate the working of deep underground mines and beneficiation of low-grade ores, which are not feasible under the present price ceiling.

Mining interests state that unless something is done to increase the number of productive mines, large and small, the iron ore industry may not be able to meet a continuing war demand. Present prices—50 cents below the 1939 rate and as much as $2.10 below those prevailing in the 1920s — make it necessary for operators to concentrate on the highest grade and most easily mined ore. As such mines approach their periods of declining production, or are exhausted, supplemental tonnage must come from presently inactive smaller and less desirable properties.

These marginal mines, they contend, will be brought into production if prices are raised to a point where a profit can be made.

The increase could be allowed either as a horizontal rise applying to all ore from all mines, or by subsidizing high-cost properties—as the government now is doing for high-cost producers of copper, zinc and lead.

Either a flat increase or premium payments to high-cost producers would tend to insure production at a sufficiently high level to meet war requirements and would permit the conservation of some of the rich, easily mined ore.

Probable effect of a substantial increase in ore prices on the ability of the industry to produce 100,000,000 tons annually for enough years to defeat the Axis has been analyzed by W. R. Van Slyke, mining engineer of Eveleth, Minn. Mr. Van Slyke says prices have profound effects upon:

1. Production of ore for the war effort.

2. Conservation of various types and kinds of merchantable ores.

3. Opening of idle mines containing ores of merchantable grade.

4. Development of processes for the utilization of various classes of low-grade ores, including the much discussed taconite.

5. The general economic prosperity and social well-being of the entire Lake Superior district.

"Labor and Materials Cost More"

"The present situation doesn't appear to make sense," declared Mr. Van Slyke, expressing the viewpoint of many Lake Superior mine owners and operators.

"In the face of an unprecedented demand for iron ore, present and prospective, with labor and materials (when one can get the latter) at higher levels than for more than a decade, with many open pits being rapidly depleted, the prices of Lake Superior ores are 50 cents lower than they were in 1939 when practically none of these conditions existed. In fact, present Lake Erie prices are lower than at any time subsequent to 1928. After 14 years of production including 1942, during which time the Lake Superior district has produced 620,000,000 tons of iron ore, one would normally expect iron ores to reflect reduced reserve, higher costs and increased demand in substantially higher prices for such a vital and indispensable product.

"The reason for substantially stationary prices subsequent to 1929 up until 1937 is not far to seek. Over-development of iron ore properties which started during the last World War was continued through the 'roaring twenties'. In 1923, the base price for Mesabi nonbessemer ore was $5.55. During 1937, 1938 and 1939 it was $4.95. Today it is $4.45 and, in many cases not that much.

"The over-developed condition of iron ore mines and property coupled with extremely heavy local taxes, high freight rate and heavy unamortized development charges, all conspired to force operators to concentrate operations on ores having a low mining cost, i.e., open pit ores.

"Then too, for reasons best known to themselves, there were always operators who were willing to or felt they had to 'cut the market' from 25 to 75 cents per ton in order to move their ores or to keep in the iron business at all.

"There seems to be no logical reason for establishing a base price of $4.45 for Mesabi nonbessemer ore in 1940, a cut of 50 cents per ton below the 1939 level. Even so, ore sales were made in 1940 in considerable volume at prices under the 1940 base. The base price levels and sub-price contracts were continued in and for 1941. Such contracts were made, in the main, during the winter of 1940-1941 when there was no particular threat of war. However, the preparedness program and aid to our allies required the mining of 80,000,000 tons in 1941 (60,000,000 tons came from the Mesabi range).

"OPA Approach Not Realistic"

"Then came war. The essential nature of iron ore in the war effort was everywhere recognized and all operators have subordinated everything to the production of iron ore. It is understood that the OPA ruled that ore prices for 1942 could not be higher than the 1941 base or the 1941 contract figure, whichever was lower.

"The efforts of the OPA to prevent inflation or runaway prices for strategic minerals are to be praised. However, the approach to iron ore prices by the OPA has not been a realistic one. The

ORE PRICES SINCE 1914

1914		$2.85	1927		$4.25
1915		2.80	1928		4.25
1916		3.55	1929		4.50
1917		5.05	1930		4.50
			1931		4.50
	April 1	5.05	1932		4.50
1918*	July 1	5.50	1933		4.50
	Oct. 1	5.75	1934		4.50
			1935		4.50
1919		5.55	1936		4.50
1920		6.55	1937		4.95
1921		5.55	1938		4.95
1922		5.05	1939		4.95
1923		5.55	1940		4.45
1924		4.75	1941		4.45
1925		4.25	1942†		4.45
1926		4.25			

*Iron ore prices established by government. †Prices controlled by Office of Price Administration.

freezing of prices on iron ore has had the following effect:

"Production in 1942 has been confined chiefly to open pit mines where operations could be conducted without loss under the ceilings established by the OPA. Reserve stockpiles are being shipped. Some few undeveloped properties where ore can be cheaply mined are being stripped. More than 92,000,000 tons of iron ore were shipped in 1942 from the Lake Superior District and 100,000,000 tons are contemplated for 1943. About three-fourths of this tonnage, or about 144,000,000 tons, will have been mined from the Mesabi range in 1942 and 1943.

"If this rate of production keeps up for only a few years at present price ceilings, the country may well find itself unable to produce iron ore in sufficient quantity to supply the demand despite large reserves in the ground. The 'cheap ore' of the Mesabi is being gutted at an alarming rate. Orderly and conservative mining has been discarded under pressure of production and this whole mineral resource is suffering as a result.

"The Lake Superior iron ore ranges and the Mesabi range in particular are the most important raw material areas in the world.

Talk About Using Taconite

"What is being done to assure a continuing supply of iron ore so that war effort and reconstruction problems after the war may be adequately met?

"Many people are aware of the extreme exigency of the situation. There has been much talk of plants for the utilization of taconite on the Mesabi range and other low-grade ores. Much has been in the press on the subject of sponge iron as a substitute for scrap.

"As to the utilization of taconite, it is true that there is here a tremendous potential resource and much work is being done looking toward its utilization. But the technology of treatment has not yet been perfected on an operating plant scale. A plant that would produce 1,000,000 tons of concentrate per year (approximately 3,000,000 tons of crude ore per year) would be a big plant. It would cost possibly $5,000,000 or $6,000,000. But it would take a good many of these plants, after the technique of large scale operation has been perfected, to make a dent in an annual production of 100,000,000 tons and thereby relieve the pressure on open pit high-grade ore production.

"The concentrating plant at Babbitt, Minn., which handled taconite containing magnetite, naturally offers the best place in which to work out the technology of treatment on other taconites containing both magnetite and hematite in varying proportions. But this plant, even if it worked the type of material it treated previously, cannot produce a concentrate at a profit at present price levels. This plant might have seen its way 'out of the woods' at price levels which were existent from 1918-1923. But when prices were cut drastically, the venture folded up. Neither this nor any similar plant can exist without a subsidy in some form or other under present price conditions.

"If the situation is bad enough so that subsidies have to be considered to enable special processes to exist because the ceiling prices will not permit commercial operation otherwise, then it is time to analyze what would be the result on the iron ranges of the Lake Superior district if changes were made on the ceiling price regulations.

"Ore production would be vastly stimulated; old properties would be reopened; presumably exhausted mines would be reworked; production would flow from properties which are now considered marginal or submarginal; and a very substantial supplement provided to the major production of ore from our operating mines and pits, if the present OPA price restrictions were to be removed. It would, of course, be necessary to promulgate other regulations. It is therefore suggested that the government take action as follows:

"1. Remove present ceiling prices and restrictions on contract sales of iron ores.

"2. Establish a ceiling substantially above the present base prices for the various base grades of iron ore from the Lake Superior district, using pre-

Iron ore stocks at United States and Canadian furnaces and at Lake Erie docks aggregate 47,424,421 tons, compared with 40,456,893 tons a year ago. About 30,000,000 tons of this will be consumed by May 1, leaving only a moderate carryover

sent methods of premiums and penalties.

"3. At the same time make this ceiling a floor, as well, by requiring that all ore sales be made at not greater and not less than the established ceiling.

"4. Give assurance, in the most positive form possible, that this ceiling-floor would continue for, say, five years with liberal provisions for amortization of capital invested during that period.

"Many objections can immediately be raised to such a procedure:

"1. It is a step toward inflation.

"2. It is price fixing without any competitive feature, i.e., no one would be permitted to 'cut the market price'.

"3. Such a procedure is contrary to our democratic processes and would be unconstitutional.

"4. No such provisions, if enacted, could be definitely assured beyond the life of any particular Congress which permitted such action.

"There undoubtedly would be some legal hurdles to be cleared in order to put into effect the foregoing suggestions. However, we are witnessing many instances of procedures to which the same objections might be raised but we are accepting them because it is necessary to the prosecution of the war. Legal hurdles have been cleared before, and particularly in times of national emergency, when the will and the necessity to do so were sufficiently strong. Just for the sake of argument, let us assume that base prices of iron ore were raised $1 per ton, which would put them back to the 1923 level. Other things being equal, the cost of producing iron and steel would be increased about $2 per ton which is less than the normal fluctuations in non-price-controlled times. It is conceivable that the price of iron and steel products could be raised a like amount without damage to the war economy. The major portion of any extra profits accruing to the iron and steel industry would be largely recaptured by the government through taxes.

"If you call this raised ceiling-floor a subsidy, and maybe it is, let us see what effect it would have on the production of iron ore from the Lake Superior district:

"1. It would be a subsidy applicable to the whole iron ore industry and not a special dispensation applicable only to the beneficiation of taconite.

"2. It would bring much closer the day and might make it an immediate probability, when beneficiation plants treating taconite could produce concentrates without help from the government other than the foregoing ceiling-floor.

"3. It would vastly stimulate the opening of former underground mines either as underground operations or transforming many into open pits, said new open pits being made possible not only by the raised ceiling-floor but also by reason of improved operating technique. Other properties, now considered marginal or submarginal would immediately be placed in the category of operations where a new dollar could be gotten for an old one as well as making possible a small profit.

"It is not necessary to dwell on the wide repercussions in the production of iron ore that would result from such a ceiling-floor. Anyone who is at all familiar with the large number of inactive properties in the Lake Superior district which are inactive solely because they are not profitable at present price levels knows that the effect would be profound. Dozens of small and relatively insignificant properties, would by every probability, immediately become active and, in the aggregate, would immediately result in the production of respectable tonnages of ore annually. 'Many a mickle makes a muckle'.

Six Underground Mines Left

"Praiseworthy as the development of beneficiation processes on taconite may be (and such developments should continue, as they would be even more sure to do under the suggested ceiling-floor) it seems reasonable to expect that underground ores, merchantable in themselves as far as iron content is concerned, together with the array of other presently marginal and submarginal ores that could be produced in large quantity with slightly higher price levels, should come into the operating picture ahead of concentrates derived from taconite.

"Nothing has been more noticeable on the Mesabi range in particular than the decline in underground mining in the past 15 to 20 years. In 1924 there were 38 operating underground mines or tram-to-pit underground scrams on the Mesabi range in St. Louis county, Minnesota. In 1942 this number had shrunk to six. This has not been due to any considerable exhaustion of underground reserves. The continued low level of ore prices has forced the abandonment of underground operations in large part."

E. W. Davis, director, Mines Experiment Station, University of Minnesota, last summer presented a report to the War Production Board, showing the Mesabi range holds a reserve of 376,624,000 tons of direct shipping underground ore, (i. e., not requiring beneficiation). The Mesabi range open pit reserve is given as 337,312,000 tons. Mr. Van Slyke points out that much of this is not stripped nor available for use. Very little of the underground tonnage is in the producing stage.

"There has been much in print about

Trucks have been used extensively in Lake Superior iron ore mining, and may be used in still larger numbers this year, for economy and speed. They can run out of open pits directly on steep grades, whereas miles of winding tracks must be available for use by mine cars. The industry must have rubber and rails to produce 100,000,000 *tons of ore this season*

a crisis in iron ore," Mr. Van Slyke continues. "There is no immediate crisis as far as reserve is concerned. But a crisis of another sort is coming in the very near future if the Lake Superior district is required to produce around 100,000,000 tons per year for a year or two more. This more imminent crisis can only be forestalled by stimulating ore production from other sources than those which are being exploited at present.

"Curtailment of underground production due to low prices has resulted in the past in a serious unemployment condition on the Mesabi range with resultant excessive recourse to WPA and other governmental aid. There naturally is no particular unemployment in the various iron ranges at present, but the rehabilitation and continuation of underground mining would be helpful in mitigating postwar unemployment in particular. Taconite concentration plants as they may be built would gradually supplement employment as underground mines became exhausted.

Idle Mines Would Operate

"4. Flow of ore that would result from the large number of now idle mines would go far to supplement and displace ore that otherwise would have to be produced from the large open pits.

A more balanced type of mining could be effected and an adequate supply of iron ore assured for the duration of the war effort and the reconstruction period after the war.

"5. The far-sighted long range policy of companies owning considerable tonnages of reserve ore should be to develop and operate their highest cost properties under the proposed ceiling-floor and thereby conserve, to a greater extent than is now possible, their reserves of high grade and cheaply minable ore.

"However, if anyone should shortsightedly prefer to concentrate on and mine out reserves of high grade and cheaply minable ore in order to achieve immediate profit, it is quite evident that most of his profits would be taken by present federal taxes of one sort or another. So the gain to the operator is more apparent than real and should go far to discourage any undue exploitation of high grade and cheaply minable reserves.

"6. As to the local tax burden which has done much to concentrate operation in the better class of properties, some form of relief should be afforded. At present the iron mining industry in Minnesota pays ad valorem, occupational

(*Please turn to page* 151)

Lower Steel Earnings Reflect Tax, Wage Increases; Product Shifts

STEEL producers' 1942 earnings declined sharply from the 1941, records of the first companies to report reveal. Net income of the leading producer was 38 per cent lower than in the preceding year. Experience of other companies varied, but reported and estimated earnings for major producers indicate the industry's decrease will approximate 40 per cent.

Two principal reasons for the poorer showing are increased labor costs and higher effective tax rates. Statements reflect the wage increases ordered by the National War Labor Board or granted voluntarily by the companies.

Contributing to the lower earnings of many companies were the changes in products necessitated by the war program. Many companies delivered less finished materials and a larger percentage of semifinished or heavy products on which the profit margin is narrow.

Other contributing causes were the higher maintenance expenses occasioned by continued peak operations and the higher overhead resulting from the extra paper work required by government controls.

Big Steel's Net Income 38 Per Cent Below 1941

Net income of the United States Steel Corp. for 1942 was $72,142,195, equivalent to $5.39 a common share, compared with $116,171,075, equal to $10.45 a common share, in 1941, Chairman Irving S. Olds reported last week.

Provisions for 1942 taxes totaled $227,891,237, against $191,502,574 in '41.

Dividends of $1.75 a share on preferred stock, payable Feb. 20 to record of Jan. 29, and $1 on common shares, payable March 20 to record of Feb. 19, were declared.

Net income for the fourth quarter amounted to $25,646,452, after taking into account tax liability, increased wage and salary payments, additional pension provisions, and various year-end adjustments. A revised estimate of the tax liability of the corporation for the full year 1942 on the basis of the revenue act of 1942 resulted in a federal tax credit of $6,200,000 for the fourth quarter, after allowance for the postwar excess profits credit realized through the retirement of debt since Sept. 1.

Wage and salary adjustments effected during the fourth quarter, totaled approximately $2,000,000, of which approximately $700,000 is applicable to the fourth quarter. These adjustments embrace the retroactive wage increases with respect to certain subsidiaries whose cases had not been determined by the War Labor Board at Sept. 30, together with commensurate increases later voluntarily made by these subsidiaries to salaried employes in the lower brackets. The total increase in wages and salaries applicable to all subsidiaries for the fourth quarter of 1942, resulting from the various retroactive wage increases ordered by the War Labor Board and from the salary increases voluntarily made to salaried employes in the lower brackets as a consequence of such orders, was approximately $6,700,000. The total increase of this character for the year 1942 was approximately $22,600,000.

Employment and payrolls were at an all-time high in 1942. Average number of employes was 335,866, compared with 304,248 in 1941. Total payroll in 1942 was $735,981,326, against $601,117,053.

A reserve of $7,000,000 to provide for contingencies attaching to the present

U. S. STEEL CORP. EARNINGS, TAXES SUMMARIZED

Earnings, shipments and tax provisions of the corporation for the fourth quarter and for 1942 and 1941:

	4th Quarter 1942	12 Months 1942	12 Months 1941
Net income	$25,646,452	$72,142,195	$116,171,075
Earnings per share for common stock	$2.23	$5.39	$10.45
Shipments of finished steel products, net tons	5,302,681	21,064,157	20,416,604
Per cent capacity	102.5	102.6	102.3
Provision for taxes:			
State, local and social security	$18,348,480	$72,491,237	$72,802,574
Federal income and excess profits	6,200,000 (Cr.)	155,400,000	118,700,000
Total taxes	$12,148,480	$227,891,237	$191,502,574

high rate of operations and other unusual conditions was set up in the fourth quarter, making a total contingencies reserve of $25,000,000 for 1942, the same amount as was set up in the preceding year.

Several important units in the corporation's expansion program are expected to be completed within the next several months, Mr. Olds said, adding that much depends on the availability of materials and equipment. The three electrolytic tinning plants at Pittsburgh, Gary and Birmingham probably will be completed before the quarter ends; some lines already are in production.

Unexpended balances on all authorizations for additions and replacements financed by the company amounted to about $136,000,000 at the close of the year, and unexpended balance for government-financed work amounted to about twice that sum.

During 1942 the corporation's ingot capacity was increased between 300,000 and 350,000 tons, mostly electric furnace capacity. Current production, Mr. Olds said, now is between 98 and 99 per cent. Substantially all the output is going into the war effort, directly or indirectly.

The corporation's scrap supply has improved considerably, a betterment attributed in large part to the various collection campaigns last year. Mr. Olds said the corporation was having no difficulty with respect to tin and manganese.

Bethlehem Steel Co.'s Taxes 7½ Times Net 1942 Earnings

Bethlehem Steel Co.'s 1942 net earnings totaled $25,387,760, equal to $6.31 a share on common stock, against $34,457,796, or $9.35 a share in 1941.

Taxes last year totaled $188,040,000, compared with $110,002,700 in 1941.

For the fourth quarter last year, net was $5,731,289, against $10,459,742 in the December, 1941, quarter, and $7,444,870 in the third quarter last year.

Orders on hand Dec. 31 amounted to $2,394,500,000, compared with $1,336,600,000 at the end of 1941. President Eugene G. Grace stated that billings for 1942 made a new high record and estimated that in view of the high amount of unfilled orders that billings for the current year should approach or equal $2,000,000,000.

Expenditures for additions and betterments in 1942 were $30,907,716, against $42,127,091 in 1941. Unexpended balance for this purpose was $39,500,000 at Dec. 31.

Mr. Grace said the company's steel capacity had been increased 200,000 net tons during the past year to a total of 12,900,000 tons.

Current ingot output is at a rate of 99 per cent of capacity. For the past year, the average was 98 per cent, against 101.5 per cent in 1941.

To illustrate the magnitude of Bethlehem's shipbuilding operations, Mr. Grace pointed out that of the total unfilled orders Dec. 31, shipbuilding accounted for $2,050,000,000.

In 1940, shipbuilding operations required 37,000,000 man-hours. This rose to 115,000,000 in 1941 and to 296,000,000 in 1942.

Discussing the renegotiation of contracts, Mr. Grace said:

"We are currently revising conditions in our contracts to meet a policy we declared at the beginning of the emergency to ourselves and to the government, namely that we are only looking for a fair and reasonable profit.

"When we reached the point on contracts where we could determine if the price against the cost resulted in an excess profit, we have adjusted such contracts throughout 1942. Under that policy we should not expect any difficulties in renegotiations."

Directors declared a dividend of $1.50 on common shares, payable March 4 to record Feb. 8, the same amount that has been paid in previous quarters.

Inland Steel Co.

Inland Steel Co., Chicago, reports consolidated net profit of $10,721,372 after a $2,000,000 reserve for postwar contingencies and provision of $23,866,000 for federal income and excess profits taxes.

Net profit was equal to $6.57 a share and compares with $14,824,053, or $9.08 cents a share, in 1941.

Provision for normal federal taxes for 1942 was $6,008,000 and provision for excess profits taxes, after giving effect to debt retirement and postwar credits, amounted to $17,858,000. In 1941 the company provided $7,605,000 for normal federal taxes and $15,650,000 for excess profits taxes.

The 1942 contingency reserve was provided out of fourth quarter earnings, which amounted to $2,607,482, compared with $3,576,711 in the last quarter of 1941 and $2,642,409 in the September quarter of 1942.

Wheeling Steel Corp.

Consolidated net profit of $4,441,964, equal to $4.61 a common share, was reported by Wheeling Steel Corp. for 1942. In 1941, net income was $8,506,304, or $11.71 a common share.

Federal, state and local taxes amounted to $9,254,367, including $6,650,000 for federal income and excess profits levies. In 1941, provision for all taxes was $10,336,567, of which $7,375,925 was for federal levies.

Profits last year were lower primarily because the different class of products sold increased costs due to curtailment of production of finished materials, increased labor rates, and increase in effective tax rates.

Keystone Steel & Wire Co.

Keystone Steel & Wire Co., Peoria, Ill., reports net profit for quarter ended Dec. 31 as $265,355, equal to 35 cents per share on common stock. This compares with $413,999, equal to 54 cents a common share, for the similar 1941 period. Provision for federal income and excess profits taxes in the final 1942 quarter totaled $146,396.

A. M. Byers Co.

Despite a 71 per cent increase in sales volume in the fiscal year ended Sept. 30, 1942, over the corresponding 1941 period, net profit earned by A. M. Byers Co., Pittsburgh, totaled $1,195,422, compared with $1,383,761 in the preceding fiscal year. Decline was attributed to higher cost of raw materials, taxes and labor rates. Taxes charged in 1942 amounted to 2,836,213, more than $2,000,000 greater than in prior year.

Endorse Retail Sales Tax as War Measure

A federal retail sales tax was recommended as a war emergency measure by the Brookings Institution, Washington, after a study completed by Charles O. Hardy and Daniel T. Selko.

The institution reported such a tax would be equitable, more easily administered than possible alternatives, and especially suited to wartime conditions and objectives. A tax of about 10 per cent on all retail sales, excluding housing, medical care and education, would be required to raise five billion dollars if there were no exemptions, it is estimated.

NE Steels Nearly Quarter Of December Alloy Output

December production of National Emergency, low alloy, steels was about 225,000 tons. Total alloy steel output in that month was approximately 1,100,000 tons. Stainless and tool steels took about 40,000 tons. Of the remainder the NE steels constituted more than 21 per cent.

That so large a proportion of alloy steel production was of the new NE analyses indicates these types are being accepted and applied in increasing degree in the effort to conserve rare alloying elements. Distributors are receiving larger shipments of these alloys and are serving an increasing number of consumers who have found them suited to their requirements.

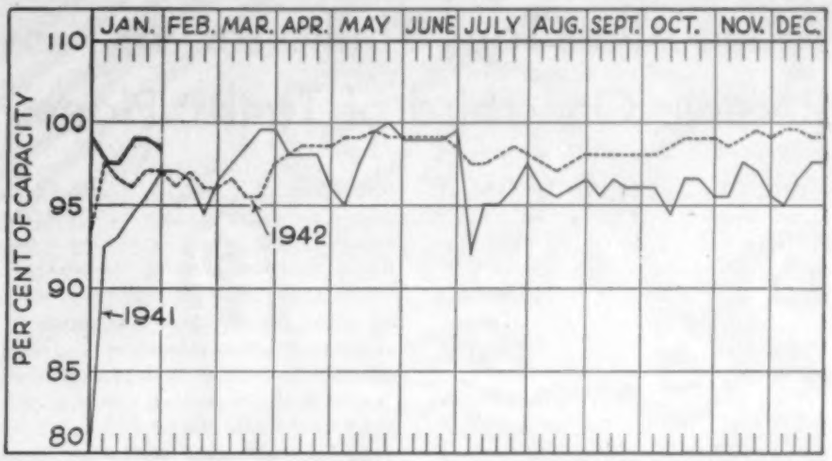
November Scrap Stocks Gain; Consumption Shows Decline

Domestic stocks of steel and iron scrap at the end of November, 1942, were approximately 6,742,000 gross tons, an increase of 8 per cent over the 6,260,000 tons reported as of Oct. 31, according to the Bureau of Mines. Stocks in hands of consumers increased 10 per cent and those of suppliers and producers declined less than 1 per cent. Consumers' stocks Nov. 30 totaled 5,427,000 tons, compared with 4,938,000 tons Oct. 31. Most of the increase in total stocks was caused by a gain of 11 per cent in stocks of purchased scrap and of 6 per cent in home scrap.

Consumption of scrap in November totaled 4,401,000 tons, a decline of 8 per cent from the 4,770,000 tons melted in October, at an annual rate 2 per cent less than in 1941. In November open-hearth furnaces consumed 58 per cent of the purchased scrap, 73 per cent of the home scrap and 79 per cent of the pig iron used. Steelmaking furnaces, including bessemer and electric, accounted for 70, 83 and 89 per cent, respectively.

Increased use of pig iron and decrease of scrap consumption is shown by the November figures. In 1941 open hearths used 19.3 per cent purchased scrap, 29.1 per cent home scrap and 51.6 pig iron. In November the respective percentages were 17.3, 28.6 and 54.1.

Carnegie-Illinois Steel Corp. blew in a rebuilt blast furnace at its Mingo, O., works Jan. 12. This stack had been down for repairs for some time and was rebuilt from parts of another furnace which had been removed from the Edgar Thomson works, Braddock, Pa., last year.



STEEL INGOTS . . . DOWN

PRODUCTION of open-hearth, bessemer and electric furnace ingots last week declined ½-point to 98½ per cent. Three districts advanced, four receded and five were unchanged. A year ago and two years ago the rate was 97 per cent, computed on the bases of capacities as of those dates.

New England—For the third week steel production has continued at 95 per cent.

Central eastern seaboard—Ingot production last week yielded slightly, dropping 2 points to 94 per cent.

Chicago — Declined 2 points to 100½ per cent as open hearths were taken off for repairs.

Pittsburgh — Slight changes in active equipment caused the production rate to recede ½-point to 97 per cent.

Wheeling — Advanced 2½ points to 82½ per cent.

Cincinnati — With one open hearth idle for repairs production held steady at 95 per cent.

Detroit — For the third week steel production remained at 93 per cent, two open hearths being idle for repairs.

Buffalo — With one interest operating at 100 per cent the rate continued at 93 per cent.

Cleveland — Addition of an open hearth at midweek caused production to rise 1 point to 92 per cent.

St. Louis — Went down 1 point to 92 per cent on a fractional loss by one producer.

Birmingham, Ala. — Lighting of its eighth open hearth by Republic Steel Corp. brought operations to 100 per cent, with 23 open hearths in service.

Youngstown, O. — Continued steady at 97 per cent with 76 open hearths and three bessemers active. The same schedule is planned for this week.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week ended Jan. 30	Change	Same week 1942	Same week 1941
Pittsburgh	97	—0.5	95	96.5
Chicago	100.5	—2	103	98
Eastern Pa.	94	—2	90	96
Youngstown	97	None	87	95
Wheeling	82.5	+2.5	95	100
Cleveland	92	+1	94.5	86.5
Buffalo	93	None	79.5	93
Birmingham	100	+5	90	100
New England	95	None	85	88
Cincinnati	95	None	84	90
St. Louis	92	—1	78	90
Detroit	93	None	87	92
Average	98.5	—0.5	*97	*97

*Computed on basis of steelmaking capacity as of those dates.

Republic Lights Coke Ovens

Republic Steel Corp. has started production in 65 new by-product coke ovens at Gadsden, Ala., bringing the total there to 102. The by-product recovery plant will be placed in operation in a short time.

Foundry Equipment Sales Index Rises in December

Foundry Equipment Manufacturers' Association, Cleveland, reports index of net orders closed on new equipment in December was 319.8, compared with 286.1 in November and 552.2 in October.

Total sales index was 382.5 in December, 338.8 in November and 540.6 in October. Index for repairs in December was 571.3, in November 497.7 and in October 505.5.

Indexes are percentages of monthly averages of sales to metalworking industries 1937-39.

Aid to Allies Tops 8 Billions; Receive One-Third of Tanks, Planes

ONE-THIRD of the total 1942 United States production of tanks and combat airplanes was sent to other United Nations under lend-lease or by direct purchase, E. R. Stettinius, lend-lease administrator and former chairman of the United States Steel Corp., told Congress last week.

Total lend-lease aid to the Allies from March, 1941, through Dec. 31 amounted to $8,253,000,000, and in addition the Allies have bought with their own funds $6,900,000,000 worth of munitions and other essential supplies in this country.

Mr. Stettinius said that lend-lease aid in the last quarter of 1942 totaled $2,482,000,000, or 30 per cent of the total. The total for all of 1942 was $7,009,000,000, or more than five times that for 1941.

Lion's share of lend-lease went to the United Kingdom, which received $3,959,950,000. British Dominions and territories received $2,393,193,000.

Soviet Russia's share was $1,532,230,000. China, because of transportation difficulties recieved only $156,738,000 over the 22-month period. Closing of the Burma road was given as the principal reason for the small amount of aid reaching China. Mr. Stettinius said shipments to China by cargo plane now are "considerably increasing" and pledged that "we shall also find other means to get to China the arms she needs."

Aircraft and aircraft parts were given to the Allies to the value of $1,198,800,000, leading all lend-lease items in value. Second was foodstuffs, of which $1,040,540,000 worth were sent abroad.

American supplies this year, Mr. Stettinius said, will have a far greater effect than they have had to date. He reported that only "a small part of the weapons used up to now against the Axis have been of American make," but added that the supplies given by this country "have been important and in some cases decisive."

The report developed the fact that until last spring Great Britain with one-third of our population was producing more arms than the United States and that "more Nazi soldiers have been killed with Russian-made weapons since the beginning of the war than on all other war fronts combined."

LEND-LEASE HIGHLIGHTS

The following table, submitted to Congress last week by E. R. Stettinius, Lend-Lease administrator, shows (in thousands of dollars) the United States' lend-lease aid from March, 1941, when the program began, through Dec. 31, 1942:

	United Kingdom	Australia, New Zealand, India, other British Territories, Egypt	U. S. S. R.	China	Other	Total
GOODS TRANSFERRED						
Military Items:						
Ordnance	147,534	130,307	39,639	14,661	41,867	374,008
Ammunition	196,288	303,172	148,288	19,491	14,783	682,022
Aircraft and Parts	344,188	483,188	318,969	37,336	15,119	1,198,800
Tanks and Parts	60,298	255,400	210,305	922	8,790	535,715
Motor Vehicles	55,465	127,588	139,136	25,453	6,664	354,306
Watercraft and Parts	285,112	90,035	15,549	447	6,651	397,794
Miscellaneous	82,773	30,926	39,816	7,025	6,281	166,821
Total	1,171,658	1,420,616	911,702	105,335	100,155	3,709,466
Industrial Materials:						
Machinery	141,369	74,792	62,001	3,603	183	281,948
Metals	251,673	131,390	113,909	8,973	617	506,564
Petroleum Products	252,862	62,427	14,806	3,237	5	333,337
Miscellaneous	269,676	100,758	56,224	5,110	17,943	448,811
Total	915,580	369,367	246,940	20,925	17,848	1,570,660
AGRICULTURAL PRODUCTS:						
Foodstuffs	880,891	56,227	101,869	.....	1,553	1,040,540
Miscellaneous	211,778	14,722	813	.....	.....	227,013
Total	1,092,669	70,949	102,382	.....	1,553	1,267,553
Total Goods	3,179,907	1,860,932	1,261,024	126,260	119,556	6,547,679
SERVICES RENDERED:						
Ship Repairs, etc.	152,975	80,932	27,656	951	3,383	265,897
Shipping	429,785	227,379	106,160	13,057	59,098	835,479
Production Facilities	175,085	212,206	136,300	15,514	14,960	554,065
Miscellaneous	22,198	11,744	1,090	956	13,625	49,613
Total Services	780,043	532,261	271,206	30,478	91,066	1,705,054
Total Lend-Lease Aid	3,959,950	2,393,193	1,532,230	156,738	210,622	8,252,733

Heating and Ventilating Engineers Elect Officers

Officers were elected at the forty-ninth annual meeting of the American Society of Heating and Ventilating Engineers, which closed at the Gibson Hotel in Cincinnati last week.

They are:

President, M. F. Blankin, Philadelphia; vice presidents, S. H. Downs, Kalamazoo, Mich., and Dr. C. E. A. Winslow, New Haven, Conn.; treasurer, E. K. Campbell, Kansas City; members of council, John F. Collins Jr., Pittsburgh, James Holt, Cambridge, Mass., and Lieut.-Commander T. H. Urdahl, Washington, D. C.

Annual report of E. O. Eastwood, retiring president, contends every activity of war was supported by engineering. "In the future," he said "science should play a much more important part in the educational system."

Timken Roller Bearing Accepts "Little Steel" Wage Formula

Extension of the "Little Steel" wage formula to Timken Roller Bearing Co., Canton, O., was announced Jan. 22 in a letter to stockholders of the company. It stated that the National War Labor Board has directed the steel firm to accept maintenance of membership, check-off and a 5½ cents per hour wage increase retroactive to Feb. 15, 1942.

William E. Umstattd, president, expressed the management's protest that the wage increase actually raises the rate of Timken workers above the average hourly increase specified in the "Little Steel" formula. However, he said company has accepted the directive as a condition under which it will operate for the duration of the war.

Algoma Workers End Strike

TORONTO, ONT.

Striking steel workers at the Sault Ste. Marie, Ont., plant of Algoma Steel Corp. Ltd. voted later last week to return to work on the same basis as employes of Dominion Steel & Coal Corp. Ltd. at Sydney, N. S. (See page 77). Officials of the two steel companies estimate about 20 days will be required to resume full-speed production.

WPB Office of Power Director Established; J. A. Krug Is Chief

CREATION of an Office of Power Director, with the appointment of J. A. Krug as its head, to take over complete responsibility within the War Production Board for electric power, gas, water and communications has been completed.

The Office of Power Director will include the present WPB Power Division and the Communications Equipment Division. Also transferred to the Office of Power Director are the functions and responsibilities of the Facilities Bureau and the Resources Agencies, insofar as they deal with electric power, gas, water, and communications. WPB Chairman Donald M. Nelson said that on all policy matters the Power Director will report directly to him, while reporting as to administrative matters to the program vice chairman.

All WPB orders affecting the utilities will be issued by the Power Director. Pursuant to determinations of the Requirements Committee, his authority includes approval of projects, allocations of materials and critical components, within the power and communications fields and allocation and rationing of utilities services.

The Office of Power Director will have the status of a claimant agency before the Requirements Committee on a level with the Army, Navy, Office of Rubber Director, and others. The office will also be the liaison between WPB and other government agencies which are interested in the utilities under its jurisdiction.

B. C. Heacock, chairman of the executive committee, Caterpillar Tractor Co., Peoria, Ill., has been appointed director general for distribution for WPB, succeeding Mr. Krug.

Steel Division Director Names Two New Assistants

Carl W. Meyers, Canton, O., and James A. Rowan, New Rochelle, N. Y., have been appointed special assistants to Hiland G. Batcheller, WPB Steel Division.

Mr. Rowan will handle special surveys covering production and distribution of steel and steelmaking materials. He was educated at Sibley College of Engineering, Cornell University, and, formerly was associated with *Iron Age*.

Mr. Meyers will serve as a member of the Production Directive Committee and as a consultant to the chief of the Steel Division's Plant Facilities Branch. Mr. Meyers was manager of the Central Alloy District, Republic Steel Corp., Massillon, O., before accepting the position with WPB.

W. R. Talbot has been named chief of the General Salvage Branch. He has been acting chief since the resignation of R. K. White Jan. 9.

Robert M. Keeney, formerly chief, Steel Division's Nickel Section, has been appointed deputy director of the General Industrial Equipment Division. Mr. Keeney was Industrial Manager of the Connecticut Light & Power Co., Hartford, Conn., before joining WPB in January, 1942.

Brig. Gen. Charles D. Young (U.S.A. inactive), formerly assistant director of the Office of Defense Transportation, has been appointed Deputy Director of that agency.

NEW FACILITIES

War Plant Additions, Equipment Purchases Authorized by DPC

CONTRACTS for new war plant facilities, to be owned by the Defense Plant Corp. and operated by the contractors, announced last week include:

With Vultee Aircraft Inc., Allentown, Pa., to provide plant facilities in Pennsylvania, at a cost approximating $4,000,000.

With Weston Electrical Instrument Corp., Newark, N. J., to provide equipment in a plant in New Jersey.

With Bonds Mill Distilling Co., Lawrenceburg, Ky., to provide equipment in a plant in Kentucky.

With the Singer Mfg. Co., New York, to provide machinery and equipment in a plant in New Jersey at a cost of approximately $500,000.

With Westvaco Chlorine Products Co., New York, to provide additional plant facilities in California at a cost of approximately $200,000. Increase will result in an overall commitment of approximately $900,000.

With Babcock & Wilcox Co., New York, for additional equipment in a plant in Ohio, at a cost of approximately $170,000. This increase will result in an overall commitment of approximately $2,700,000.

With Monsanto Chemical Co., St. Louis, for additional plant facilities in Texas at a cost of approximately $2,000,000, resulting in an overall commitment of approximately $15,000,000.

With Bechtel-McCone-Parsons Corp., Los Angeles, to provide additional facilities at a plant in Alabama costing approximately $1,150,000. The increase will result in an overall commitment of approximately $13,700,000.

With Briggs Mfg. Co., Detroit, to provide additional equipment for a plant in Michigan at a cost of approximately $700,000, resulting in an overall commitment of approximately $5,700,000.

With Diamond Iron Works Inc., Minneapolis, to provide additional equipment for a plant in Minnesota, resulting in an overall commitment of approximately $125,000.

With Wenatchee Alloys Inc., Canton, O., for additional plant facilities in Washington at a cost of approximately $120,000. This increase will result in an overall commitment of approximately $1,250,000.

Plane Assembly Line Is Four Blocks Long

To meet demands of the Army Air Force for large numbers of a new dive bomber, the A-25, a major expansion program has been carried out at the Missouri plant of the Curtiss-Wright Corp. and company has shifted emphasis from other Army and Navy warplane types as a result. Quantity production on the plane on a continuous assembly line has been under way for some time.

This assembly line, a result of experience gained in the use of floor chain conveyor systems in assembly of other warplanes, is more than four blocks long. Fuselages, center sections and engines are fed into it from other moving lines. A power conveyor 1100 feet long handles center sections; an 800-foot floor chain conveyor system provides for fuselage assembly; an overhead conveyor line one block long attaches mounts and accessories to the engine.

Texas-Illinois Pipe Line Laid in Less Than 6 Months

World's largest pipeline, 551 miles of 24-inch steel pipe, from Longview, Tex., to Norris City, Ill., was completed Jan. 21, less than six months after the first pipe was laid. Advance was at the rate of six miles per day at times and a record of 9.93 miles was made one day.

Work is under way on an eastern extension of 857 miles to the New York-Philadelphia refining area, expected to be completed by June. The line to Norris City cost about $35,000,000, and the entire project will be about $95,000,000.

More Must Be Done by Large Companies, Batt Tells "Clinic"

URGING large industrial concerns to extend the subcontracting of their war work, William L. Batt, WPB Vice Chairman, pointed out at Cleveland last week that so-called big business must maintain the small organizations, because failure to do so will hurt post-war economy.

Mr. Batt spoke at a dinner concluding the Northern Ohio War Production Clinic, a meeting sponsored by the local organizations of various technical societies and the Cleveland Chamber of Commerce to assist smaller war plants in solving engineering and management problems. More than 1000 persons attended.

Explaining the necessity for placing most contracts with large producers in early days of the war program, Mr. Batt stated that the urgency for speed demanded that the orders go to companies experienced in mass production and already equipped with the required facilities, particularly precision equipment.

Management and labor have done a laudable job in war production to date, he added, but no relaxation in their efforts can be tolerated because an even greater task lies ahead in meeting the enlarged 1943 goals.

Simplification and substitution of materials and goods are one of the most important cogs in industrial production under a war economy, Mr. Batt declared in urging that the most be made of available raw material supplies.

Principal feature of the Clinic were 11 panel meetings to discuss various engineering and management problems. Subjects covered included preventive maintenance, personnel and training, welding, utilization of idle equipment, processing methods and tooling, inspection, material control, heat treating methods, salvage of tools and material, the Controlled Materials Plan, and electrical problems.

At a general session preceding the panel meetings, facilities and functions of district procurement and inspection offices of the Army and Navy were outlined. Suggestions for the best procedure by small plants in engaging in war work were offered in a talk by C. J. Reese, president, Continental Motors Corp., Detroit. In negotiating contracts, he recommended obtaining legal advice before making commitments, and urged that the manufacturer have a complete knowledge of what equipment and facilities will be required. In the latter connection he warned against expecting to be able to obtain numerous new tools. Know CMP, he advised. "Have a man in your organization thoroughly familiar with priorities as they affect material procurement."

At the panel meeting devoted to the Controlled Materials Plan it was stated that the new regulation covering procedure for obtaining maintenance, repair and operating supplies will eliminate much of the paper work involved in the present method of ordering such supplies. This regulation, CMP-5, is to be issued shortly. An amendment to Priorities Regulation No. 11 (Production Requirements Plan) also is due soon and will serve as a guide to industry in its transition from PRP to CMP.

The latter plan is proceeding satisfactorily in the steps preliminary to its introduction April 1, it was reported, but manufacturers were reminded that necessary application forms should be filed by the Feb. 9 deadline to insure applicants the preference position under CMP.

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Typical of the War Production Clinics being held in various sections of the country is the view (below) of some of the manufacturers in the Cleveland district who met in Carter Hotel, Cleveland, Jan. 27. Speakers at the principal meeting were: Left to right —Lt. Commander William Baker, Office of Inspection of Naval Material, Cleveland district; C. J. Reese, president, Continental Motors Corp., Detroit; Arch T. Colwell, vice president, Thompson Products Inc., Cleveland; Major George L. Becker, United States Army Air Forces Central Procurement district, Cleveland area; Captain J. C. Carpenter, United States Army Ordnance Office, Cleveland district

PRIORITIES–ALLOCATIONS–PRICES

Weekly summary of orders and regulations issued by WPB and OPA, supplementary to Priorities-Allocations-Prices Guide as published in Section II of STEEL, Dec. 14, 1942

L ORDERS

L-39 (Amendment): **Fire Protective, Signal and Alarm Equipment,** effective Jan. 20. Removes quota restrictions on manufacture of certain types of fire extinguishers made of steel. Permits manufacture of stirrup pumps which contain no critical materials and which conform to certain specifications. Prohibits use of copper in manufacture of foam and back-pack extinguishers. Imposes control on sale and transfer of brass fire hose couplings. Prohibits delivery of fire sprinkler systems and signal and alarm equipment except on orders approved by WPB. Restricts manufacture of high-powered air raid warning devices except on rated orders. Halts manufacture after Feb. 19 of incendiary bomb control equipment except on specific WPB authorization.

L-42 (Amendment): **Plumbing Fixture Fittings,** effective June 15. Permits assembly until March 15 of completed items of trim and fittings of the following varieties: two-valve over rim bath faucet; two-valve bath and shower combination; double bath faucet; lavatory compression faucet; lavatory combination assembly less pop-up waste; two-valve shower assembly; sink faucet; and sink combination swing spout faucet. Producers must use materials that were "frozen" in producers' hands on June 15, 1942. Limits sale of permitted assemblies only to Army, Navy, Maritime Commission, War Shipping Administration, and National Housing Agency, or on orders assigned ratings under P-55, P-110, P-19-d, and P-19-h.

L-158 (Amendment): **Automotive Replacement Parts,** effective Jan. 26. Establishes sequence of deliveries by producers. Purchase orders for account of Army, Navy, and Maritime Commission are invalidated unless they bear rating of AA-1 or higher.

L-217 (Amendment): **Construction,** effective Feb. 1. Prohibits use of alloy steel in angledozers or trailbuilders, in bulldozers, and in repair parts for both of these items. Power control units, prime movers, and antifriction bearings are exempted from the restriction. Permits use of alloy steel which construction producers will have in inventory on Feb. 1.

L-252: Valves, effective Jan. 25. Establishes separate specifications for: gate valves; globe, angle and cross valves; and check valves. Exempts valves used on ships. Eliminates cross valves as well as brass or iron angle check valves. Specifications provide in part: brass valves may be made only in sizes of 2 inches or less; union bonnet rings and stuffing box packing nuts for brass valves must be made of malleable iron or steel; steel valves in pressure classes of 150, 600, 900 and 1500 lb. must follow specifications set either by American Standards Association or the American Petroleum Institute; iron valves of five pressure classes and of 29 sizes are permitted.

M ORDERS

M-9-c (Amendment): **Copper,** effective Jan. 20. Permits use of copper engraving plates which were in engravers' possession on Dec. 31, 1942, as well as any old plates for printing calling cards, greeting cards, social and business stationery and other similar articles. The engraver must sell to scrap dealers before end of each quarter three pounds of old engraved plates for each pound of copper or copper base alloy products which he engraved for use in the same period.

M-43-b: Tin, effective Jan. 27. Prohibits use of tin in repairing certain gas meters. Also bans use of 38 per cent tin solder for resealing meters with less than 300 cubic feet rated capacity.

M-200 (Amendment): **Milk Shipping Containers,** effective Jan. 15. Provides new quota formula to permit manufacturers to use sufficient iron and steel to make about 1,500,000 cans in the 12 months ending June 30, 1943. Limits use of iron and steel during period from July 1, 1942, to June 30, 1943, to 65 per cent of amount used in the preceding like period plus the difference between the weight of iron and steel actually put into process for manufacture of milk cans and covers since July 1, 1942, and prior to Jan. 15, 1943, and that which would have been processed if all cans and covers so manufactured had conformed to the specifications of the amended order except with regard to capacities.

M-261: Strapping for Shipping Containers, effective Jan. 25. Prohibits use of strapping unless: weight of container and contents exceeds 90 lb.; net weight of the contents exceeds 0.038 lb. per cubic inch; use is required by Interstate Commerce Commission; specified by Army, Navy, Maritime Commission, War Shipping Administration; for export outside both United States and Canada; for wooden shipping containers for specified edibles; for wooden lard or butter tubs, buckets or pails; for closing fibre drums or hexagonal or octagonal fibre containers.

M-280: Copper Rollers, effective Feb. 15. Prohibits use of copper textile print rollers which were idle in the hands of producers from Sept. 1, 1941, to Sept. 1, 1942. Such rollers must be sold either to a brass mill or to the Metals Reserve Co. for copper reclamation. As an alternate, producers may set aside an equivalent amount of other copper rollers in place of rollers which were idle if they find they want to use the idle rollers at some future date. Freezes all rollers held by dealers and permits their sale only to brass mills or the MRC.

P ORDERS

P-126 (Amendment): **Refrigerating and Air-conditioning Systems,** effective Jan. 21. Raises ratings for replacement parts needed by users in first class of users from A-1-a to AA-2X; in second class from A-3 to AA-3; and in third class from A-8 to AA-4. Does not cover comfort cooling systems for purpose of lowering the temperature or humidity of the air in any enclosure. Old parts must be turned in at time of replacement.

PRICE REGULATIONS

No. 4—Iron and Steel Scrap, effective Jan. 26. Establishes Toledo, O., as a basing point on No. 2 busheling at a maximum price of $15.35 per gross ton. Corrects previous schedule by inserting Toledo as basing point on machine shop turnings at $13.85, on mixed borings and turnings at $12.85, and on shoveling turnings at $14.85.

No. 10—Pig Iron, effective Feb. 1. Establishes basing point price of $21.50 per gross ton at Provo, Utah, on basic pig iron.

No. 136—Machines and Parts and Machinery Service, effective Jan. 22. Adds to Appendix "A", which uses Oct. 1, 1941, as a base for computing ceiling prices, instruments for measuring, testing, recording and indicating, and other precision devices which are motivated by electricity but do not measure electrical quantity.

No. 309—Platinum Metals, effective Feb. 1 in District of Columbia and Feb. 11 in rest of country. Establishes following maximum prices per ounce for metal 99.5 per cent pure: Platinum $35; palladium $24; ruthenium $35; rhodium $125; iridium $165; and osmium $50. Maximums for metals less than 99.5 per cent pure are established at the highest individual level prevailing Jan. 1 through March 31, 1942.

No. 310—Reusable Structural Shapes, effective Feb. 1. Establishes maximum price of $2.75 a pound, f.o.b. shipping point, on sales to consumers of shapes, plates and shafting.

"Freeze" Period Ordered for Machine Tool Deliveries

A 60-day "frozen" period to apply to the schedules of machine tool producers has been established in an amendment to General Preference Order E-1-b.

During the freeze period, a manufacturer's schedules for delivery are not to be upset or modified by the receipt of higher rated orders. Such a period was established by the original order issued April 30, 1942, and later eliminated as to orders for the aircraft program by the amendment of Nov. 5, 1942. The present order as amended thus reinstates the original "frozen" period, extending it, however, to 60 days for all types of machine tools.

Restrictions on Purchase of Used Conveying Machinery Lifted

Restrictions on the purchase of used conveying machinery and mechanical power transmission equipment have been lifted by amendment to Limitation Order L-193. This and other provisions have been made to remove the delay in obtaining some essential mechanical power transmission equipment and to solve production problems that have arisen under the original order L-193.

Certain replacement and repair parts are exempted from the restrictions on the use of critical materials, under the terms of L-193 as amended, but non-metallic parts may not be replaced with metal parts nor may steel be used to a greater extent in replacement and repair than in the original part.

Restrict Gas Meter As Tin Conservation Move

More than 250,000 pounds of tin per year will be saved by the prohibition on use of tin in repairing certain gas meters which is contained in Supplementary Order M-43-b.

Normal practice has required that gas meters be tested for accuracy periodically from four to ten years, and when found inaccurate, be repaired. Each such repair required resealing the meter with solder containing in excess of 38 per cent tin.

New order forbids use of tin in meters of less than 300 cubic feet per hour capacity, except in meters found upon testing to be inaccurate by more than plus or minus 4 per cent. Meters which have not been repaired internally for 12 years are also excepted.

WINDOWS of WASHINGTON

Three agencies, one government and two private, planning for postwar economy. Major objective is providing employment for demobilized soldiers and sailors and for dislocated war workers

IN THIS department in last week's issue it was stated that the three groups that direct postwar planning and that serve as clearing houses for ideas on postwar planning, are the National Resources Planning Board (the government agency), and the two private agencies, the National Planning Association and the Committee for Economic Development.

These three agencies conduct their studies in close contact with each other and with many groups in and out of the government. They act as spark-plugs to encourage postwar planning generally.

In other words, the planning job as a whole is well organized and efficient, it is devoid of politics and self-interest, and is aimed squarely at the insurance of permanent prosperity after the war.

The National Resources Planning Board may be mentioned first, for the reason that it is a part of the White House staff. It dates back before the Roosevelt administration, its original ancestor having been President Hoover's Social Trend Committee. Since then its name and status have been changed a number of times. In 1939 it was set up as now organized, the former Employment Stabilization Office being merged with it.

As now constituted, it is a long-range planning body that makes studies and reports directly to President Roosevelt. It has three divisions, one responsible for economic studies and reporting on trends of income, employment and business activity; another responsible for physical resources such as land, water, energy, and special studies in the field of transportation and industrial problems; the third is responsible for public works plans and programs. The term "energy", as used above, covers, coal, waterpower and electric current.

The board has issued more than 100 reports which deal not only with postwar planning but which are used currently in studies intended to stimulate war production. The board also is studying actively the postwar utilization of the new war plants, also the future of the aviation industry. It is studying health and education plans. The board is planning soon to launch studies on various other significant subjects, such as peacetime products, technological improvements in products, and postwar distribution of civilian goods.

The studies of the National Resources Planning Board definitely are not—as so many have feared—aimed at regimenting the American economy. Originally, its aim was to find the causes of sore spots in our economy. Then, in November of 1940, when we had started on all-out conversion to war production, the board was instructed to look into postwar problems. As will be shown later, it has covered a lot of ground in establishing a proposed framework for the postwar economy.

A SPECIAL REPORT TO INDUSTRY

POSTWAR PLANNING

This is the second of a series of a detailed study of what is being thought about and accomplished toward making the postwar world a place in which the individual and industry may flourish.

Chairman of the board is Frederic Delano, distinguished in his own right in addition to being President Roosevelt's uncle. Mr. Delano is an old time railroad man. He started his career in the engineering department of the Chicago, Burlington & Quincy railroad. Then, to gain more fundamental knowledge, he became an apprentice machinist. Following this he was appointed engineer of tests, next superintendent of freight terminals at Chicago and finally general manager of the system. Eventually he was elected president of the Wheeling & Lake Erie railroad and the Wabash Pittsburgh Terminal railroad, later serving, in turn, as president of the Wabash railroad and the Monon railroad. He later became a member of the Federal Reserve Bank.

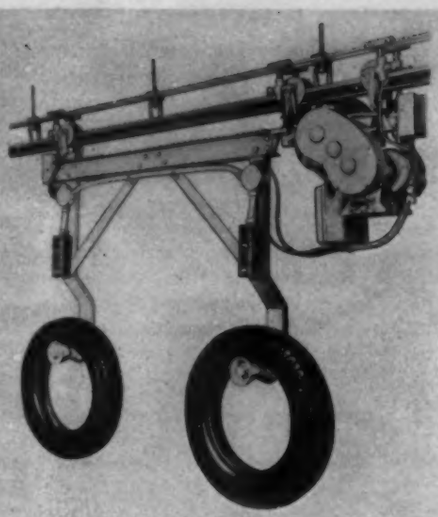
In addition to engineering and transport service with the A. E. F. in France during the first world war, in the course of which he was promoted to the rank of colonel and for which he was awarded the Distinguished Service Medal and was made a member of the French Legion of Honor, he has served the government in various important posts. In other words, Frederic Delano's government career began long before Franklin Delano Roosevelt ever was considered in connection with the Presidency.

Vice chairman of the board is Charles Merriam of the University of Chicago, who, incidentally, has been with the board and its predecessors since the original setup was organized by President Hoover. He also is a member of the President's Committee on Administration Management.

Third member of the board is George F. Yantis, a lawyer from Olympia, Wash., who has had extensive experience as a member of planning bodies in the Northwest. The board has two advisors, Beardsley Ruml, chairman, Federal Reserve Bank of New York and treasurer, R. H. Macy & Co., New York; and Henry S. Dennison, president, Dennison Paper Co., Framingham, Mass. The board's director is Charles W. Eliot, son of the famed Harvard University president of that same name. Mr. Eliot has had extensive experience in city planning. For a number of years he was director of planning for Washington, D. C., and its environs.

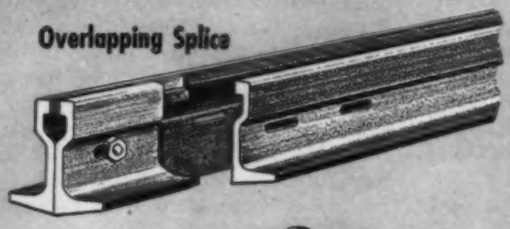
The National Planning Association is organized as a non-profit, educational group and is incorporated in the District of Columbia. Its membership represents a cut across all segments of our national economy, including business, labor, agriculture and other key groups. Its chairman is Charles E. Wilson, who resigned from the presidency of the General Electric Co. to serve as vice chairman of the War Production Board.

Its board of trustees includes the following: W. L. Batt, vice chairman, War Production Board, on leave as president, SKF Industries Inc., Philadelphia; Morris L. Cooke, consulting engineer; Chester C. Davis, president, Federal Reserve Bank of St. Louis; Clinton S. Golden, assistant to the president, United Mine Workers of America; Luther H. Gulick, director, Office of Organization Planning, War Production Board, and director, Institute of Public Administration; Alvin H. Hansen, special economic advisor, Board of Governors of the Federal Reserve System and professor of economics, Harvard University; Marion H. Hedges, director of research, International Brotherhood of Electrical Workers; S. T. Henry, assistant to president, McGraw-Hill Publishing Co.; James G. Patton, president, National Farmers Union; Emil Rieve, president, Textile Workers Union; George Soule, author; Philip Clayton Staples, president, Bell Telephone Co. of Pennsylvania; Charles W. Taussig, co-chairman, Anglo-American Caribbean Commission and president, American Molasses Co.; Robert J. Watt, international representative, Amer-

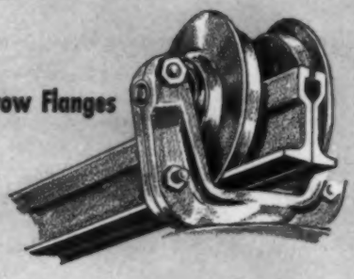


Flexible application of standard parts results in tailor-made systems without extra cost.

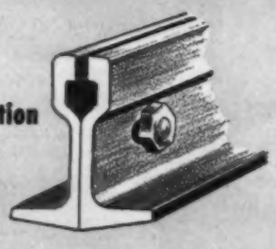
Overlapping Splice

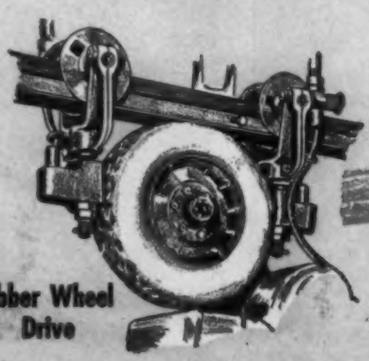


Narrow Flanges



Twin Section Track





Rubber Wheel Drive

BETTER

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IMPROVED POSITION THEN!

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ican Federation of Labor; Clarence Pickett, executive secretary, American Friends Service Committee, Philadelphia; William H. Schubert, vice president, Bank of the Manhattan Co., New York; Hans Christian Sonne, president, Amsinck-Sonne Inc., New York. Director of the association is E. J. Coil. Headquarters are at 800 Twenty-first street, N.W., Washington.

Fostered by Jesse Jones

Newest of the groups is the Committee for Economic Development, also a District of Columbia educational corporation. In May of 1942 Jesse Jones, Secretary of Commerce, invited a group of business men to form an independent committee to assist business in preparing to met its responsibilities after the war. This committee is financed by contributions from business and is managed by a self-perpetuating board of trustees. However, the Department of Commerce is co-operating actively with the committee. In fact, Carroll L. Wilson now is on leave from his post of director of the Bureau of Foreign and Domestic Commerce to spend his full time as executive secretary of the committee. Furthermore, Will L. Clayton, assistant secretary of the department, an industrialist and merchant from Houston, Texas, is one of the committee's trustees.

Paul G. Hoffman, president, Studebaker Corp., South Bend, Ind., is chairman of the board of trustees of the Committee for Economic Development and William Benton, vice president of the University of Chicago, is vice chairman. The other trustees, in addition to the already mentioned Will H. Clayton, are:

Chester C. Davis, president, Federal Reserve Bank of St. Louis, St. Louis; Ralph E. Flanders, president, Jones & Lamson Machine Co., Springfield, Vt., and member of the Economic Stabilization Board; Marion B. Folsom, treasurer, Eastman Kodak Co., Rochester, N. Y.; Clarence Francis, president, General Foods Corp., New York; Lou E. Holland, president, Holland Engraving Co., Kansas City, Mo.; Charles R. Hook, president, American Rolling Mill Co., Middletown, O.; Reagan Houston, industrialist and merchant, San Antonio, Texas; Jay C. Hormel, president, George A. Hormel & Co., Austin, Minn.; Eric A. Johnston, president, Brown-Johnston Co., Spokane, Wash., and president, Chamber of Commerce of the United States; Harrison Jones, chairman, Coca-Cola Co., Atlanta, Ga.; Charles F. Kettering, vice president, General Motors Corp., Detroit; Thomas B. McCabe, president Scott Paper Co., Chester, Pa.; Reuben B. Robertson, executive vice president, Champion Paper & Fibre Co., Canton, N. C.; Harry Scherman, president, Book-of-the-Month Club, New York; John Stuart, chairman, Quaker Oats Co., Chicago.

The trustees hold their meetings at various places; they recently held one at Princeton Inn, Princeton, N. J. Office of the executive secretary is in the Commerce building, Washington.

Seasoned the "Hard Way"

Thus, the committee has trustees who represent both big and small business, and are men who came up the hard way. The theory is that executives who rose the hard way and underwent a lot of kicking around probably have developed a greater degree of resourcefulness and initiative—characteristics on which the trustees place much emphasis.

Whereas the National Resources Planning Board focuses mainly on planning from the governmental point of view and whereas the National Planning Association looks at it from the point of view of various economic groups including industry, labor and agriculture and so on, the Committee for Economic Development is thinking in terms of what industry itself can contribute to postwar prosperity. It is undertaking two major types of effort. One of them is research on basic problems of the postwar economy. The other is stimulation of individual business managements and local business groups in every community to begin canvassing their individual postwar possibilities now.

Flanders Guides Research

The committee's research committee has Mr. Flanders as chairman and Mr. Davis as vice chairman. Its members include William L. Batt, vice chairman, War Production Board; S. Bayard Colgate, chairman, Colgate-Palmolive-Peet Co., Jersey City, N. J.; Donald David, dean, Graduate School of Business Administration, Harvard University; Max Epstein, chairman, General American Transportation Co., Chicago; Mr. Johnston; Thomas W. Lamont, J. P. Morgan & Co., New York; Beardsley Ruml, treasurer, R. H. Macy & Co., New York, and chairman, Federal Reserve Bank of New York. Mr. Hoffman and Mr. Benton are ex-officio members of this and other committees.

The Committee for Economic Development has retained a Research Advisory Board of distinguished social scientists. Its chairman is Prof. Sumner Slichter of Harvard University. Other members are: Dean Robert Calkins, School of Business, Columbia University; Dean Lloyd K. Garrison, Law School, University of Wisconsin; Prof. Neil H. Jacoby, secretary, University of Chicago; Harold Lasswell, director of War Communications Research, Library of Congress; William I. Myers, head of the Department of Agriculture Economics,

C. SCOTT FLETCHER
Field director, Committee for Economic Development

FREDERIC A. DELANO
Chairman, National Resources Planning Board

DR. THEODORE O. YNTEMA
Research director, Committee for Economic Development

PAUL G. HOFFMAN
Chairman, Committee for Economic Development

DR. LUTHER H. GULICK
Trustee, National Planning Association

DR. CHARLES E. MERRIAM
Vice chairman, National Resources Planning Board

CHARLES E. WILSON
Chairman, National Planning Association

CARROLL L. WILSON
Executive secretary, Committee for Economic Development

Cornell University; Theodore W. Schultz, head of the Department of Economics, Iowa State College; Ralph Young, professor of economics, University of Pennsylvania.

The well-known Prof. Theodore Yntema, University of Chicago economist, has taken leave of absence from his regular post to serve as the committee's full-time research director.

Twelve Regional Chairmen

The program for stimulating postwar planning by communities and individual businesses is in charge of the Field Development Division, of which Mr. Folsom is chairman. This group will consist of 12 regional chairmen, one for each federal reserve district. Those so far appointed include: John Stewart Bryan, newspaper publisher, Richmond, Va.; Ralph Budd, president, Chicago, Burlington & Quincy Railroad, Chicago; George Crabbs, chairman, Philip Carey Mfg. Co., Cincinnati; Walter D. Fuller, president, Curtis Publishing Co., Philadelphia; Henry P. Kendall, president, The Kendall Co., Boston; E. L. Kurth, industrialist, Lufkin, Tex.; Frank Rand, chairman, International Shoe Co., St. Louis; George Sloan, industrialist, New York; Grant Stauffer, president, Sinclair Coal Co., Kansas City, Mo.; Harold W. Sweatt, president, Minneapolis-Honeywell Regulator Co., Minneapolis; H. Carl Wolf, president, Atlanta Gas Light Co., Atlanta.

C. Scott Fletcher, sales manager, Studebaker Corp., South Bend, Ind., is on leave of absence to serve as field director for the Field Development Division of the Committee.

District chairmen numbering between 135 and 150 will be selected, approximately one for each million population. Local chairmen for all principal towns and cities in the various trading areas of the nation will also be appointed.

"How can I put my neighbors and my neighbors' sons back into peacetime work, making or selling the things we all need?"

That is the question the committee wants to have every industrialist ask himself. It is believed that if all managerial groups, particularly those guiding the destinies of small plants, will set their minds to work on this problem right now, they will uncover opportunities to make and sell enough goods at prices people can pay—thus providing in substantial numbers the postwar jobs that people will expect and demand. The committee takes the position that preparation and planning to provide jobs for demobilized soldiers, sailors and war workers is the very least business must do towards insuring a free society and high standards of living after the war.

Local chairmen have been appointed and local committees now are functioning in three test communities—Peoria, Ill., Reading, Pa., and Wheeling, W. Va. A good start also has been made with groups independently organized at Rochester, Buffalo and Baltimore.

The Committee for Economic Development has prepared a booklet entitled "Preparing for High Levels of Employment and Productivity". All interested manufacturers — and every manufacturer has a big stake in this planning for the postwar economy — can get a copy by writing to Carroll L. Wilson, committee secretary, Commerce building, Washington.

Further details about postwar planning, and particularly the government's postwar planning, will be set forth in this department in future issues. The whole story is one that carries vast implications for industry.

BEARDSLEY RUML

Ruml Plan Offers "Postwar Relief"

POSTWAR as well as immediate relief in meeting the sharply increased income tax obligations is contained in the "pay-as-you-go" collection proposal originated by Beardsley Ruml, R. H. Macy executive, now being considered by Congress.

Much of the emphasis in discussions of the proposal is placed on the immediate relief that would be afforded those who have acquired a heavy obligation on 1942 earnings and who have not saved the money to meet it. This stems from the fact that a year's taxes would be forgiven and collection of the current taxes would be started immediately, eliminating the one-year lag that has characterized income tax collections since 1913.

Fiscal students argue that this year's burden for many taxpayers will be five or six times more than they paid last year —on top of the 5 per cent victory tax now being deducted at the source. They also point out that about 32,000,000 persons who never paid income taxes before will

be subject to them this year, and that many have made no provision for them.

A second argument for the plan—that of postwar relief—presupposes that many persons will experience sharp reductions in wages and salaries at the end of the war. Under the present income tax collection plan, such a person would still be obligated for the past year's taxes on a higher income—taxes which would have to be paid from a reduced income, unless provision for them had been made by savings.

Under the Ruml plan, the taxpayer would be up to date on payments; if income were reduced, tax payments would be proportionately eased.

It long has been admitted that the practice of paying one year's taxes out of next year's income puts individuals in a tight spot if their income stops or shrinks. In times of rising incomes it delays the deflationary effect of new income taxes.

If, at the end of the war, the feared unemployment results from the demobilizing of service men and the reconversion of war factories to peace factories, unpaid back taxes would act as a deflationary influence at a time when inflationary influences would be desirable—as they have been in past periods of slack employment.

While the Ruml plan has won impressive support in Congress and among taxpayers, the Treasury Department has balked at the idea of forgiving a full year's taxes.

Actually, proponents of the plan contend, there would be no loss to the Treasury and no immediate gain for the taxpayers as a whole. Although the government would forgive 1942 tax debts, it would collect 1943 taxes a year earlier. Its flow of income thus would be uninterrupted.

CMP Applications for Allotments Should Be Filed by Feb. 9

Harold Boeschenstein, director, Controlled Materials Plan Division, WPB, announces application for allotments under CMP are being received from manufacturers in increasing numbers, and urged all who could possibly do so to file completed CMP-4A and 4B forms by Feb. 9. The director again pointed out that those who meet the CMP time schedule in this respect will enjoy the added advantage of allotment numbers in obtaining materials for second quarter production. Orders bearing allotment numbers will take precedence over those bearing only preference ratings.

"Manufacturers who were asked to submit bills of material should understand that they must now also send in their applications for allotments of controlled materials. Bills of material, although necessary to determine production needs in terms of units, do not represent applications for allotments of controlled materials," Mr. Boeschenstein added.

By mid-February, when the first direct allotments of aluminum, copper and steel are made to prime contractors under CMP, WPB's 143 field offices will be equipped with specially trained personnel to assist manufacturers in the initial operation of the plan.

Types of Valves Permitted Reduced from 4079 to 2504

Number of types of gate, globe, angle, cross, and check valves now produced will be reduced from 4079 to 2504 under Limitation Order L-252.

Valves are classified by design, by materials used, by pressure and by size. The complete elimination of cross valves and of brass or iron angle check valves will reduce permitted designs. Pressure classes will be reduced from 18 to 12. Under the order, valves will be produced in fewer sizes.

The reduction will cut down the use of brass and steel for valve manufacture. WPB officials estimate that about 1900 tons of copper will be saved annually, which is approximately 9 per cent of the amount used by the valve industry. The order is also expected to save about 4340 tons of alloy steel per year. This is about 27.5 per cent of the amount used in valve production.

Because many of the valves used on ships must meet special conditions, they are not covered by the order. Valves ordered for ship construction approximate 45 per cent of the total.

Regardless of the pressure class, brass valves may be manufactured only in sizes of two inches or less. Union bonnet rings and stuffing box packing nuts for brass valves are to be made of malleable iron or steel.

Steel valves in pressure classes of 150 pounds, 600 pounds, 900 pounds, and 1500 pounds are to follow specifications set by the American Standards Association or the American Petroleum Institute. For each pressure class, the order covers end flange faces, the materials for bodies and bonnets, seating materials for stems, bonnet bolting and bonnet bolt nuts. On valves of five inches or larger, the disc is to be of the same material as the body of valve.

Iron valves of five pressure classes, from 25 pounds per square inch to 300 pounds per square inch, and 29 sizes from one-quarter of an inch to 72 inches, are permitted under the order. On all types, end flanges are to conform to existing standards. Materials are specified for seating parts, bonnet bolts or studs, bonnet bolting and handwheels. There are separate specifications for gate valves, globe, angle, and cross valves and for check valves.

50,000 Tons More Steel for Farm Machinery Allotted

An additional 50,000 tons of bessemer steel for the manufacture of new farm machinery in the first quarter has been allotted by the WPB, raising the total from 137,000 tons to 187,000 tons. This is in addition to the recent action increasing the quota for the manufacture of repair parts from 137 per cent to 167 per cent of 1940 production.

The new allotment was made by the war board following criticism by the Senate Truman committee that the food program for 1943 and 1944 had been imperiled by drastic curtailment in the amount of steel permitted to go into farm implements (STEEL, Jan. 25, p. 14).

WPB Chairman Donald M. Nelson said the Senate committee's criticism was based on the program drafted last July by the WPB Office of Civilian Supply.

"Conditions since have changed, as they so frequently do in wartime," Mr. Nelson said. "The program should be and is being enlarged." He added that the OCS formula was sound when drafted in the light of armament needs then prevailing.

Prohibit Alloy Steel in Angledozers, Bulldozers

Use of alloy steel in angledozers or trailbuilders, in bulldozers, and in repair parts for both of these construction equipment items, is prohibited after Feb. 1 by Limitation Order L-217, Schedules III and IV.

Basic order L-217, issued Nov. 17, 1942, provided for the application of simplification and conservation measures to construction machinery and equipment production through the issuance of schedules affecting specific equipment.

Power control units, prime movers, and antifriction bearings are exempted from the denial of the use of alloy steel in both Schedules III, covering tractor-mounted angledozers or trailbuilders, and Schedule IV, covering tractor-mounted bulldozers. Producers may also use such alloy steel as is in inventory or in transit to them on Feb. 1.

Considerable saving of alloy steel used in production of these items is anticipated, particularly since their manufacture is now greater than it was in 1941.

Exterior of Pentagon building, the War Department's headquarters, has a perimeter of nearly one mile. Adjacent to the huge edifice are paved parking areas to accommodate 8000 automobiles, while an intricate highway system provides easy access for both buses and private cars. Official United States Army photos

New War Department Building Nearly Mile in Circumference

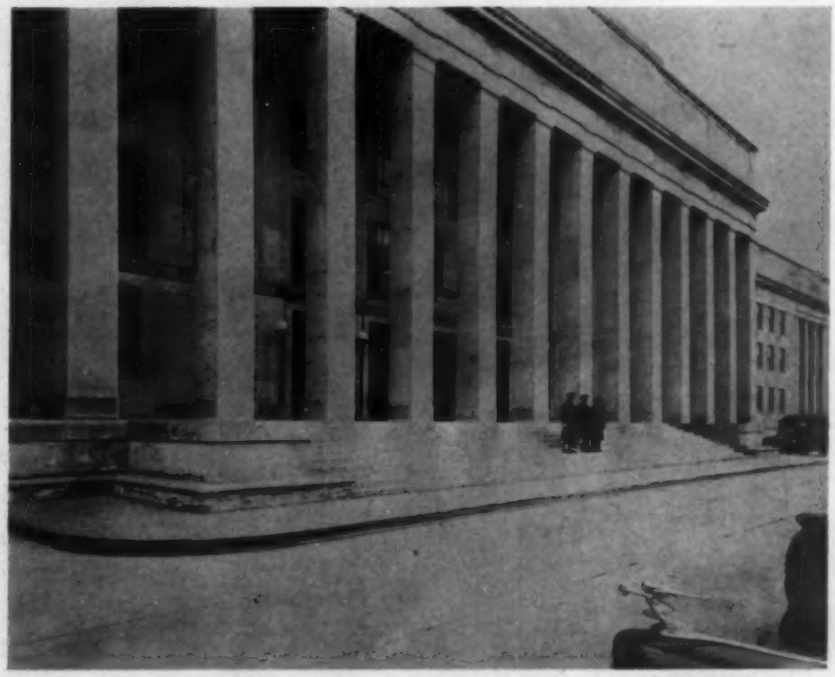
HEADQUARTERS for directing the Army's end of the war is the gigantic new Pentagon building just across the Potomac from Washington. The five sided structure is almost a mile in circumference and is termed by the War Department as the largest office building in the world.

At present, it houses 22,000 persons, including officers and enlisted men and civilian personnel; soon it will provide accommodations for 40,000.

Construction of the building, which has a cubic volume of almost 91,000,000 feet, under ordinary circumstances would take about seven years. Actually it required 14 months.

When the War Department looked around for a site on which to locate quarters to house its fast growing personnel, it encountered many problems. Collection and dispersal of 40,000 workers under one roof, twice a day, could effect serious local traffic congestion in any city, and the population of Washington was expanding tremendously due to the war impetus. Services and utilities such as electricity, gas, water, steam for heating, refrigeration for air conditioning, sewage disposal and telephone mains for such a huge building, with the concurrent increase of already overtaxed services in the highly developed areas, had to be considered.

Finally, a 400 acre site in Virginia, on the opposite bank of the Potomac river from Washington, was selected. Traffic arteries, overpasses, and paved roadways totaling many miles were built or rebuilt on this site into a complete modern highway system serving the entire area. These roads are carried over and under 21 bridges which are constructed generally of rigid frame reinforced concrete, faced with stone. Parking spaces for 8000 cars were paved.



Stately columns guard one of the main entrances to the building. Army and civilian personnel are admitted only after presentation of identification card. Sightseeing is not permitted in wartime

As no elevators are included, the height of the building was kept low, five stories, and ramps 20 to 30 feet in width were provided for the mass movement of the workers in and out. Incidental escalators are provided together with stairways as secondary means of movement. Choice of shape, pentagon or circle, was to decrease the long distance of travel that the common wing type of structure would impose, but at that there are 16½ miles of permanent and potential corridors. However, this five-sided plan encloses five concentric rings of offices and corridors around a central court of five acres.

Thus, the plan approximates a circular shape which affords the shortest length of travel from point to point, and full advantage of this is taken by an ingenious system of radial and ring corridors. The inner ring, that adjacent to the court, is the main corridor 1800 feet in circumference and from which, like the spokes of a wheel, radial corridors reach to the outer rings, the outermost being

Buses that carry War Department personnel to and from work enter the Pentagon by means of two tunnels, while a third is used by taxis and official cars. Approximately 10,000 persons use the Capital Transit buses operating between Washington and the building. Suburban buses operating into Virginia carry 4000 more and the remainder use private cars

almost a mile around.

Each side of this five-sided edifice is 921 feet long and it is 1491 feet across its greatest width. In contrast, great Pyramid of Cheops is only 752 feet square at the base.

While the building is of reinforced concrete and all exterior walls of the light courts and the center court are of architectural concrete, the exterior perimeter is of limestone. The roofs of the outer and inner rings are sloping and covered with green slate.

Running between the third and fourth rings through four sections of the building is a 40-foot roadway, open to the sky and furnishing access for maintenance vehicles, access to freight elevators and entrance for fire protection equipment. This is reached from the outside by two driveways through the building and connects with the center court by the extension of these driveways.

Indirect illumination is used generally throughout the building with bottom bowl silvered lamps. The sight line is controlled either by a glass bowl or by concentric metal rings. The telephone exchange installed, is large enough for a city of 125,000 population.

Cafeterias on practically every floor seat about 6000 people and lunch counters are provided for another 1000 people throughout the building.

There are 40 miles of pipelines around the building and it contains 7600 windows.

The structure rests on concrete piles, 40,000 of them, cast in place. Placed end to end, these piles would extend for 200 miles. Total gross area of the structure is 6450 square feet.

On the ground floor is a bus and taxi station and six ramps to the upper floors converge here to accommodate the passenger. The bus terminal will accommodate 30,000 people an hour—28 or more buses simultaneously. The terminal has two floors—a great concourse 150 x 690 feet on the upper floor, with stairways for the workers to descend to the bus and taxi loading points on the ground floor.

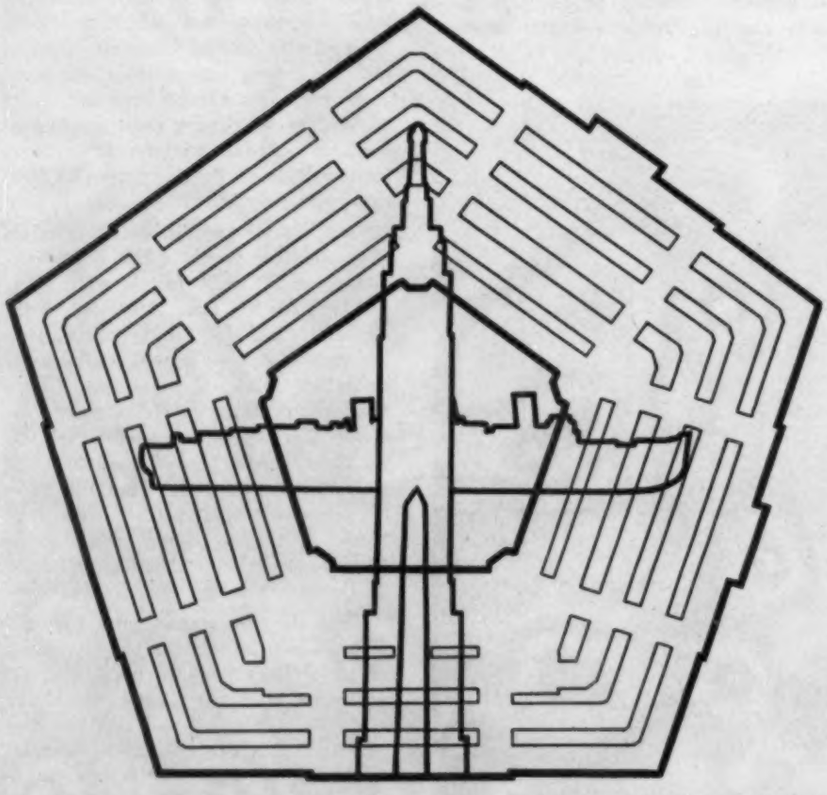
Small Theater Seats 350

Facing the concourse are a bank, post office, shops etc. and a 500-foot soda bar or lunch counter. Six of the ramps to the upper floors open onto this concourse. There are also maintenance shops and space for a maintenance personnel of 2000. A theater seating 350 people is located on the fifth floor and is used to show training films.

Each face of the edifice is a front, though two appear more important than the others. One of the less important appearing sides, provides a canopied delivery platform 300 feet long. Each offers a 140 foot colonnade of great square 36 foot columns, with two flanking colonnaded entrances. On three sides the columns are engaged with the wall. On the two more important appearing sides, the central colonnades are projecting porticoes, extending upwards 36 feet.

In front of each of the latter is an extensive terrace. From the terrace facing Columbia Island and the Lincoln Memorial, and 20 feet below it, extends a 1000-foot landscaped mall. From the

(*Please turn to Page* 154)



Size of the edifice may be judged by this scale drawing of the Pentagon building, Empire State building, QUEEN MARY, *and Washington Monument*

England Maintaining Essential Steel Output After 39 Months of War

VINCENT DELPORT
European Editor, STEEL

LONDON, ENGLAND

AT THE end of three and a quarter years of total war the steel industry of Great Britain can look back with satisfaction upon the fact that the supply of steel for many essential purposes has been maintained. During the early course of the war it was possible to lay aside stocks to meet increasing demands which would be inevitable. These stocks to some extent included American supplies which were sent to this country at a time when America herself was still operating on a nonbelligerent basis. During the course of the past year this policy has proved its value as today it seems clear that demand will continue to outstrip production and it is safe to assume that these stocks are now being utilized.

Throughout 1942 steel output in Great Britain was maintained at high levels, despite melting practice in many works being changed to utilize native low-grade ores with a ferrous content averaging approximately 30 per cent, compared with prewar imported ores which frequently exceeded 80 per cent. At the same time the production of special and alloy steels greatly increased.

It is not surprising that capacity in some directions has been severely strained. During the early part of the year it was possible still to draw upon America for certain essential requirements, but America towards the middle of the year began to experience the same conditions which prevailed in this country earlier and has been compelled to increase capacity to meet demands which had not been entirely foreseen.

In common with the other belligerents America also requires those kinds of steel which are in greatest demand in this country and it may be said now that the bottlenecks which prevail in Britain are common to all the belligerent powers. In this respect, we are at least at no greater disadvantage than the enemy.

The Iron and Steel Control has also, through reductions in specifications and other measures, done a great deal to conserve vital raw materials.

During the course of the war everything possible has been done to ease conditions for workers in the iron and steel industry. Canteen facilities, adequate arrangements for female workers, off-time for shopping, the provision of mobile food vans for iron workers and similar measures have all been pushed forward energetically with beneficial results. To meet the increased cost of living certain wage increases have already been negotiated. Relations between workers and managements are healthy and it is probably true to say that in an industry in which at all times capital-labor relations have been good, conditions now are rather better than at any time in the past.

It can be said the industry under the regimen of the Ministry of Supply faces the future with assurance, in a general state of readiness for further emergencies. That these will be increasingly grave and more difficult to overcome as the war goes on is evident.

Sir John Duncanson, Controller of Iron and Steel for Great Britain, has been forced temporarily to interrupt his duties, owing to illness. Sir Charles Wright, who resigned the position of Controller in September, 1942, owing to ill health, has sufficiently recovered to be able to step into the breach and take over from Sir John Duncanson during his enforced absence.

Kenneth Lampson has been appointed assistant controller, Iron and Steel Supplies Department, Iron and Steel Control, Ministry of Supply. Mr. Lampson has been with the Iron and Steel Control since May, 1940, when he was seconded by Dorman Long and Co. Ltd. to act as liaison between the Control and the French Armaments Mission. After the French collapse he took charge of the export side and for a considerable period was responsible for the operations of B.T.5 in conjunction with the Board of Trade. He was later, following the change of policy which led to a great reduction in exports, appointed assistant to the Deputy Controller in charge of Iron and Steel Supplies. Since this time he has been closely associated with Sir John Duncanson, controller, and George Briggs, deputy controller. Mr. Lampson took over his new position Jan. 1.

Lend-lease shipments of war materials to Russia from March, 1941, to Jan. 1, 1943, include 3200 tanks, 2600 planes, and 81,000 military motor vehicles, Edward R. Stettinius Jr., administrator, reports.

ANTI-TANK MINES "SPOTTED" WITH MAGNETS

These anti-tank mines were laid by the Germans in Tripolitania in an effort to slow the British Eighth Army, closely pursuing them. The mines are unearthed by engineers who locate them by means of magnets

Simple guard for power drills improves operation

Information supplied by an Industrial Publication

Safety in small things as well as great is an excellent policy for manufacturing plants today. Adding safety devices to small power driven hand tools has the same results as the same procedure on heavier machines. Operators can work better because their attention is undivided.

That was the idea behind a guard for power driven hand drills devised by a worker in an airplane factory. He noticed that hole spotters sometimes got pinched fingers when the drill suddenly punched through the work.

The guard is very simple. It consists of a steel sleeve set into the drill chuck surrounding the shank of the drill bit. It is easy to attach, and it could be made from scrap tubing, or bar stock cutoffs with a minimum of machining.

In operation, when the drill goes through, the guard brings up against the work, and stops forward motion of the tool. It is long enough so that the operator's fingers cannot be caught between the work and the drill body. As a result slowing down caused by the operator's natural tendency to flinch is eliminated.

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MOLY

By A. H. ALLEN Detroit Editor, STEEL

MIRRORS of MOTORDOM

Weary Rickenbacker brings message from boys in battlefront hell-holes. Jibes at home-front bickerings. . . Cadillac doubles best peacetime man-hour record; building new combat vehicle

DETROIT

APPEARANCE of Capt. Eddie Rickenbacker in this city ten days ago was an event bedecked with all the best tinsel of the motor capital in ballyhoo, ostentation and official hoop-de-doo. Somehow the show seemed to be characteristic of the entire U. S. in this war year of 1943, sugar-coated by the Hollywood touch and set off by the ministrations of sundry public relations experts.

There is no disputing the fact that Rick was and still is a great fellow. His miraculous rescue story now is running in *Life* magazine and makes exceptionally interesting reading. His passionate love for his country and his willingness to carry on although a sick man are traits found all too seldom these days.

But Rick hates the fanfare and circus aspects of a day such as he spent here. When he accepted the invitation of the local section of the S.A.E. to address its dinner meeting, he specified that he also wanted to visit some war production plants in this area and to talk to the workmen there. So a tour was arranged to whisk him around four or five large plants during the course of the day before appearing at the S.A.E. dinner.

The tour was even carefully rehearsed, and police escorts lined up to rush the party around town. There were about two dozen in the group, which occupied two city buses. At the last minute, with planes grounded by bad weather, Rick was forced to take the train from Washington and arrived an hour and a half late, completely upsetting the prearranged schedule. However, he did manage to visit the Packard Rolls-Royce plant, Willow Run, the DeSoto Warren plant and Ternstedt, but obviously there was little time for any heart-to-heart chats with working people at these spots. There were the usual photographic ceremonies to be observed, official parties to be corralled for group pictures, a bomber to be autographed, etc.

1200 Hear Address

So it was a weary Rickenbacker who sat down to dinner around 7 p. m. at the Book-Cadillac hotel, where a small and intimate crowd of 1200 had gathered at $5 per plate to hear him talk. At Rick's own request, the menu was kept simple (he probably was thinking of what happened after the famous Baruch dinner in Washington), the entree being New England boiled dinner.

Lined up either side of him at the speakers' table was the cream of the executive talent of motordom, from Henry Ford on down, as well as distinguished Army, Navy and government personnel. In front of him was a battery of half a dozen microphones which made Rick look like an unhappy prisoner behind the bars. Across the banquet room and aimed directly at the speakers' table was a row of perhaps six powerful searchlights, virtually blistering the faces of those at the front table. These were required to provide illumination for a battery of newsreel cameras which ground out a record of the event.

Since the heavy demand for tickets to the occasion had required the use of several other dining rooms, it was necessary to remove the tables from the main hall to permit all the outsiders to crowd in to see the speaker. Temperature of the ballroom probably was in the neighborhood of 90 degrees. Tobacco smoke was as thick as a London fog.

Kettering was Toastmaster

C. F. "Boss" Kettering, General Motors research chief, was toastmaster and in the heat and pressure of trying to keep the program moving on time looked something like a New England boiled dinner himself. Since six Detroit radio stations were broadcasting the event and their announcers and technicians were buzzing around like flies, there was little time for formalities other than introduction of those at the head table.

A prize remark was that made by Boss Ket in introducing K. T. Keller, Chrysler president, when he identified Keller as being connected "with a motor company in the city".

Promptly at nine the radio announcers signaled the crowd to begin applauding. After reading a telegram from General Pershing who regretted his inability to be present, Mr. Kettering introduced Rickenbacker and he launched into his speech delivering it in extemporaneous fashion although following the transcript closely. After half an hour, with Rick still going strong, the radio people held a hurried conference and decided to continue on to the end, though originally scheduled to cut off at 9:30.

Rickenbacker's address was a powerful, moving thing, with drama which brought tears to the eyes. But the real punch came when he said:

"Men and women of Detroit, if you could understand what our boys are doing in these hell-holes throughout the Pacific and burning sands of Africa, that your way of life may be preserved, and the character that has made this nation great may be carried on, you would not worry about eight hours a day, overtime, or double time for Sundays and holidays. You would not worry about whether you were producing too much per man per day. No, you would be and should be grateful for the privilege of offering everything you know how."

The crowd roared approval. Robert A. Lovett, assistant secretary of war, winced perceptibly. A buzzing swept from the audience, as one man asked another, "Wonder what the unions will say about that?"

And Rick went on: "It is imagination, individuality, self-reliance and initiative that are going to win this war for America—not only on the field of battle, but on the home front. For bear in mind that when this war is over there will be more rugged individualists come back to America from the four corners of the world than we ever had at any one time in our history. They do not want, and will not accept, regimentation of their lives, or planned economy. They will want the same opportunities and will demand them, and will get them, that we have had, for they are entitled to them.

"If necessary to make us appreciate our duties, bring back the troops from the hell-holes of the world, place them in the factories; take the war workers and place them in the fox-holes with filth, vermin, diarrhea, malaria and the Japanese, and I will guarantee you that production will be increased, and much of it doubled—within 30 days.

Wants Congress to Aid Returning Men

"It is now time that our Congress should provide legislation to provide three things: First, that any member of our armed forces, upon his release or discharge, can be employed by any employer without having to join any organized labor unions; second, that upon his employment he shall have equal voting rights with any other employe in any employe-management plan of the employer; and third, that his seniority in relation to other employes of draft age should date as of the day he enlisted or was inducted into his country's service."

It might be argued the politic thing for the unions to have done was to let these verbal punches in their direction pass along unnoticed, in view of the more basic import of Rick's message, but the UAW-CIO took up the cudgel the next day and charged the speaker with being misinformed and misguided by executives of the motor industry.

Philip Murray, CIO head, in town for an address before the Economic Club

Monday, said that all union labor had prayed for Rick's safe return and that he hoped, in respect to the pokes at union labor, "God would forgive him for he knows not whereof he speaks."

Rickenbacker made one other important point in his address, which no doubt will result in some redesigning of military equipment. He said: "With this war certain to last two years or possibly more, and our transport planes becoming larger and larger, in ever-increasing numbers because of the ever-increasing demand, artillery, trucks, tractors, bulldozers and everything that it needed for the troops on the ground and in the field should be designed with one thought in mind, of making them simple to disassemble and reassemble so they may be transported by air. It is an absolute necessity."

Cadillac Doubles Man-Hours

On the occasion of receiving the Army-Navy E recently, Nicholas Dreystadt, general manager of Cadillac, revealed that his division is now devoting more than twice the man-hours to war production as were required at the peak of peacetime automobile production. June, 1941, was the peak peacetime month, when man-hours totaled 1,350,000. In December, 1942, this figure had jumped to 2,873,000, and the increase was accomplished by rearrangement of existing facilities and without erection of any new buildings.

Cadillac's part in tank building was disclosed for the first time, although the division was making plans for this activity early in 1941. Letter of intent for a quantity of light tanks (around 14-ton size) was received Nov. 13, 1941, and exactly 138 days later, or 55 days after the last motor car was completed, the first tank was shipped. Last May, tanks were being shipped on a regular schedule which has been steadily increased. In September, production of another type of combat vehicle was started, the first of which was delivered just before Christmas. No information has been released on this latter job, but it would be a good guess that it is some form of modified tank, or tank destroyer, since practically all tank builders are now working with "tank destroyers" of one type or another.

A host of new developments in combat vehicles and ordnance materiel is in the making. Some may eventually get to the battlefront; others will never emerge from the experimental chrysalis. One promising development is a shell rotating band of composite steel and copper construction which permits saving a major part of the copper normally required in these bands. Another intriguing possibility on the horizon is a method of forming steel cartridge cases of one-piece construction from tubing. An interesting story likewise might be written about the conversion of military trucks to amphibian service. Hundreds of these grotesque looking vehicles can be seen around Detroit any day, but it is doubtful if much could be pried loose about their "dual" construction details.

The WPB's automotive division has caught up with October, 1942, statistics on shipments of war goods from motor plants, and has announced that they totaled in value $646,920,000, up 12 per cent from September. Figures are derived from reports on plants owned by 133 companies, comprising seven major automobile manufacturers, eleven truck builders and 115 parts producers, or about 68 per cent of the entire industry. Backlog of war orders in the hands of prime contractors in the industry only at the end of October totaled a little over 11½ billion dollars, or 22 months' work on the basis of shipments in that month.

Oxygen, Calcium Carbide Shortages Seen in '43

Shortages of oxygen and calcium carbide are anticipated early this year, members of the Oxygen and Acetylene Industry Advisory Committee were told at a meeting in Washington last week.

Recent survey of oxygen requirements compared with production indicates a serious shortage during the first half of 1943, government representatives said. This shortage may be aggravated and prolonged, depending upon completion of new plants under construction.

Members were asked to advise the Chemicals Division of places where conservation measures can be applied and where consumption can be reduced with the least hindrance to the war effort.

A discussion of calcium carbide, used for production of acetylene, indicated requirements will be considerably greater than production for several months, and possibly longer if current plant expansion and construction is further delayed. Stocks will be reduced to a bare minimum shortly, making necessary drastic cuts in allocations and probably curtailment of small orders.

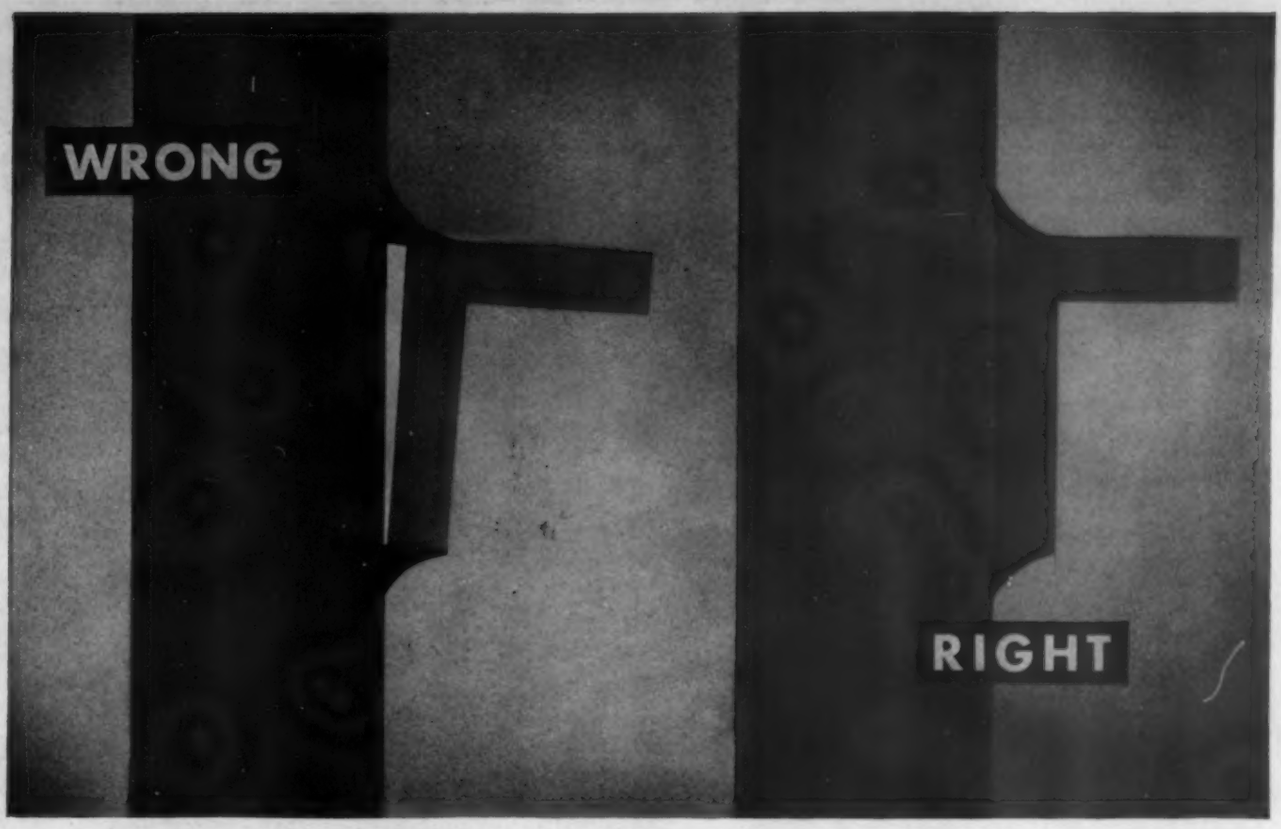
These commodities are vital to the production of synthetic rubber, many war chemicals, ships, steel, airplanes, tanks, and other implements of war.

A sub-committee was appointed to study the cylinder turn-over so that some plan may be adopted for equitable distribution to the industry of new cylinders expected to be made available some time in the spring. All gas producing companies requiring cylinders during the current year were asked to advise the War Production Board of their requirements.

Cross-hauling of compressed gases and of calcium carbide was discussed, and a complete study is to be made of ways to eliminate unnecessary hauling.

SCRAP DISMANTLING TRUCKS BUSY SIX DAYS A WEEK

CHEVROLET dealers in Chicago, allied with Victory Service League, have equipped special scrap dismantling trucks, carrying acetylene torches, block and tackle and other wrecking gear, to assist in tearing down old iron fences, railings, boilers and similar items. Two men operate the equipment. Trucks are busy six days a week



Showing waste of weld metal due to inaccurate fit-up. Errors of this kind can result in electrode consumption double or more of what is required.

HOW IMPROPER FIT-UP WASTES ELECTRODES

OPERATIONS prior to welding often affect the ultimate amount of weld metal required. Attempts of the welder to correct improper fit-up, for example, will result in waste of electrodes, as well as labor and power. ¶ To help conserve the vital supply of welding electrodes: (1) Every joint must be designed so that the minimum of weld metal can be used, without sacrificing strength. Irregular contours should be avoided wherever possible, and proper allowance for distortion caused by welding should be made. (2) Lay-out work, cutting and shaping must be done accurately, and close tolerances maintained. (3) Fitting-up must be accurate, jigs and fixtures being used wherever possible.

This is one of a series of advertisements on the important subject of electrode conservation. If you wish reprints of the series as they are issued, send us your name and address.

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WING TIPS

New air giants take to skies. . . Safety features on Lockheed Constellation particularly important in transport operations. . . 1,000,000 helicopters ten years after war?

LOCKHEED'S giant four-motor Constellation, designed originally from plans by Howard Hughes for TWA air lines, took to the air for the first time officially about three weeks ago at Burbank, Calif., in the presence of many aviation notables, civilian and military. The new ship has been taken over by the Army Air Forces which identifies it now as the C-69, destined probably for use as a long-range high-speed transport.

Detailed specifications are not available because of restrictions but a few facts about the long, slim triple-rudder airliner can be reviewed. Four Wright Duplex Cyclone engines, rated close to 2000 horsepower each and weighing about 1.1 pounds per horsepower, give the ship a speed about 100 miles an hour faster than present commercial air transports, or an indicated cruising speed at half throttle of around 275 miles an hour. Lockheed spokesmen point out the plane can cruise through thin air at 20,000 feet, although a pressurized and sealed cabin will maintain a density corresponding to the 8000-foot level, permitting the ship to rise comfortably to 35,000 feet if necessary.

Speed, range and load-lifting capacity are inherited from the twin-engine Lockheed P-38 fighter plane; in fact, aerodynamically the C-69 wing is an enlargement of the P-38 wing. Fowler flaps reduce landing speed to around 77 miles an hour, and a new "maneuvering" flap gives the plane three distinct sets of performance characteristics. Quoting from a Lockheed release: "With flaps telescoped onto the wing, the plane is a speed and distance champion. The maneuvering flap increases the lift of the wing so that the Constellation will climb rapidly out of a short field, or maneuver slowly during icing conditions or bad weather. The landing flap brings it in to the airport at reasonable automobile speed.

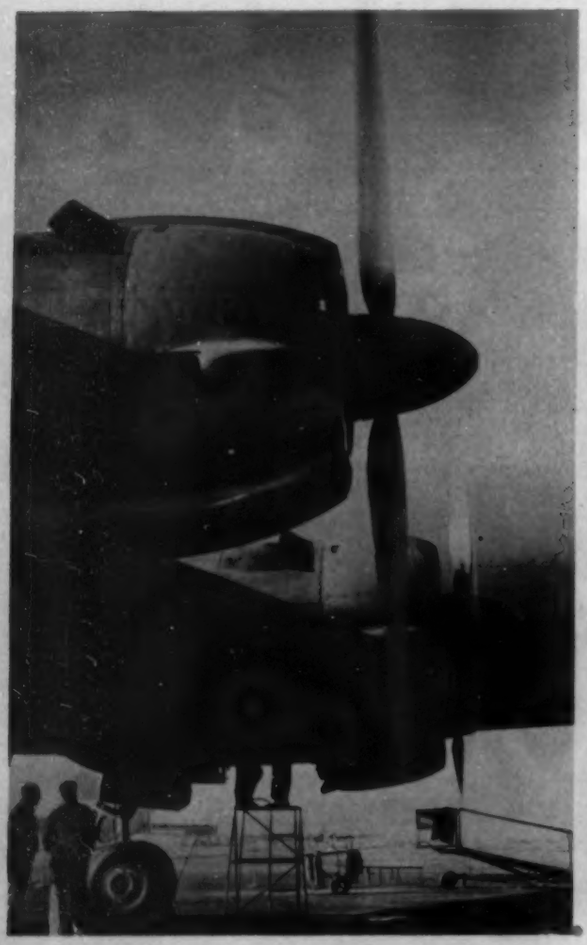
"Another aerodynamic advance is the engine nacelle and cowling which make it possible to house and cool 2000 horsepower with no more drag than recent aircraft required for 800 horses."

A number of unusual safety features are built into the new transport, including stainless steel engine nacelles and cowlings within which a fire could be confined for 30 minutes without interrupting flight or causing serious damage; and automatic fire control devices with 16 thermocouples in each nacelle, advising the flight engineer where to operate his remote control extinguishers.

Other features are dual brakes on the dual wheels, minimizing the danger of brake failures; the Lockheed "hot wing" de-icer, using engine exhaust instead of pulsating rubber sleeves or boots; hydraulic boosters on all controls, reducing pilot fatigue; pressurized cabin with two superchargers, either of which will maintain correct air density; triple tail, giving better control especially after partial engine failure; passageway in wing, permitting the flight engineer to reach all engines during flight; and 25,000-foot ceiling with one engine out, or 16,500 feet with two engines out.

The Constellation's landing gear is of the well-known tricycle type, fully retractable, with the dual nose wheels carried on a long, hinged tubular steel section.

Another first flight made recently—four days before the Constellation's take-off in fact—was that of the twin-engine Curtiss C-76 or Caravan, built almost entirely of wood. The Caravan is a high-wing monoplane, with wing span of 108 feet, length 68 feet and power supplied by two 1200-horsepower engines. Landing gear is of the retractable tricycle type and is built so low (as a result of the high-wing design) that cargo floor of the fuselage is only 36 inches from



Stainless steel engine nacelles and cowling shroud four 2000-horsepower engines in the CONSTELLATION, *reducing fire hazard*

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the ground, facilitating rapid loading and unloading. First of the Caravans are being built in a Curtiss Missouri plant, and quantity production will be under way shortly at a new plant "somewhere in Kentucky," where a system of feeding subassemblies into a main assembly channel will be followed. Sixty-five per cent of the plane is said to be subcontracted to the wood industry.

Future of Helicopter

Obviously there is not much positive thinking being done as yet concerning aviation in the postwar world, for one reason because the current demands for manufacturing and improving combat planes are too intense, and secondly because any realistic contemplation of the aviation postwar world is apt to bring on the shudders.

One of the most intriguing possibilities for contemplation, anyway, is Igor Sikorsky's helicopter. He has been going around the country in recent months giving brief discussions of his prodigy and showing some rather startling color movies of its performance. Sikorsky is engineering manager of the Vought-Sikorsky Aircraft Division of United Aircraft Corp., but the helicopter appears to be more of a pet project of his own than a postwar project for United Aircraft.

According to the record books, Sikorsky holds helicopter pilot license No. 1 and has logged about 1000 hours in the air, his longest sustained flight being 1 hour and 32 minutes, and longest nonstop flight 100 miles. Sikorsky is a great friend of W. B. Stout who is now doing special research for Tom Girdler's Consolidated Aircraft. In their spare time, Stout and Sikorsky have put the helicopter through a series of remarkable paces, distinguished chiefly by its ability to take off or descend almost vertically and to move in any desired direction in the air.

The experimental ship, weighing about 1300 pounds and of metal construction, is powered by a motor of around 85 horsepower driving a central propeller or rotor on a vertical shaft and a smaller propeller on a horizontal shaft at the rear. The helicopter is controlled by regulating the incidence or pitch of the main blades, fore and aft as well as from right to left. A single control stick is used and as Sikorsky says, all you have to do to make the ship go in any chosen direction is "just poosh on ze stick" in that direction. Lift of 2-5 pounds per horsepower is obtained through the regular rotor blades but by using a larger diameter blade this may be increased to 10-15 pounds per horsepower.

Sikorsky's latest ship is of the amphibian type, with two inflated rubber bags replacing the conventional landing gear wheels. The inventor does not vision his craft as competing at all with the airplane, but rather supplementing it for short hauls with confined landings and takeoffs.

His movies of experimental maneuvers suffer because of the lack of a professional touch in the camera work, and they are too small for public showing. One wonders why a company the size of United Aircraft has not placed its facilities behind the Russian inventor and provided him with some more effective display material. With all due credit to Sikorsky as an inventor and flyer, it seems apparent that if the helicopter ever does become the universal vehicle its progenitor foresees (1,000,000 in use within ten years after the end of the war) the manufacture and merchandising of the product will long since have been divorced from its designer. This is the lot that befalls nearly all inventors of new modes of transportation and there is little reason to suspect that history will not repeat itself.

Lick Cold Starting

A practical (but still secret) method of starting airplane engines in subzero temperatures has been developed by engineers of the Pratt & Whitney Aircraft Division of United Aircraft Corp., working in conjunction with Buick Motor Division (a Pratt & Whitney licensee) and the Texas Co. Experimental cold room in Buick's Flint, Mich., plant, once used to solve cold weather problems in automotive engine design, was made available for the research work, which was productive of a new mobile starting system now in daily use in Northwest Canada and Alaska. Nothing is related of how the equipment operates, but here is the problem: Temperature 48 degrees below zero; a radial aircraft engine, standing for hours in the open wind, must be started at once. Every part must be in perfect adjustment; the starter must operate; the engine must be turned over; fuel must be vaporized and furnished to the cylinders; a good hot spark must be generated. Figure out a mobile unit which will do all this and you will know what the engineers concocted.

Considered one of the fastest flying boats ever built, the Consolidated Model 31, equipped with latest combat improvements, will go into mass production at the New Orleans plant recently taken over by Consolidated from Nash-Kelvinator at the request of the navy.

The navy has designated the twin-

Cargo floor of the Curtiss C-76 Caravan, shown here on the occasion of its maiden flight, is only 36 inches off the ground, permitting rapid loading and unloading

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engine high-wing monoplane the P4Y (P: patrol craft; 4: third major model change from the prototype; and Y: Consolidated) and its prototype was launched about four years ago as a commercial venture. Original model specifications called for a crew of 5, with capacity to carry 52 passengers by day and sleep 28. Wing span was 110 feet, length 73 feet and gross weight about 50,000 pounds. Although a flying boat, it was provided with a retractable tricycle beaching gear, nose wheel housed in a well in the bottom of the hull and side wheels springing upward into wells in the side of the hull. Outboard floats which retracted to the underside of the outer wing panels also were provided. Engines in this early model were two Duplex Cyclones of Wright manufacture.

First flight of an American-built counter-rotating propeller of the constant-speed type was made from Rentschler Field in East Hartford, Conn., about two weeks ago, as Hamilton-Standard Propellers Division of United Aircraft Corp. unveiled the result of eight years of development work. The propeller unit used was 12 feet in diameter and the flight was also believed to be the first in the world of a feathering counter-rotating propeller.

Consolidated-Vultee's Merger Plans

MERGER of Consolidated Aircraft Corp. and Vultee Aircraft Inc., creating one of the largest aircraft manufacturing enterprises in the world, is proposed in recommendations approved by directors of both companies for submission to stockholders, it was announced last week by Tom M. Girdler, chairman of Consolidated and Vultee. Stockholders will vote on the proposal March 17.

"The merger of the two companies," Mr. Girdler said, "has been under consideration since Vultee acquired 34 per cent of Consolidated's outstanding stock at the end of 1941. It will permit use of combined plant and personnel for all-out production of military airplanes."

Each share of Vultee common stock will be exchanged for 45/100th share of the new Consolidated Vultee Aircraft Corp. common stock. Consolidated's present common stock will be exchanged share for share for common of Consolidated Vultee. Vultee's outstanding $1.25 cumulative preferred stock will be exchanged share for share for the new preferred stock of Consolidated Vultee, convertible into 1-⅛th shares of new common stock.

Consolidated Vultee upon consummation of the merger, and on the basis of the number of shares of the constituent companies now outstanding, will have a capitalization consisting of 216,729 shares of $1.25 convertible preferred stock and 1,385,933 shares of common.

Consolidated, builder of the Liberator B-24 bomber and Coronado and Catalina flying boats, which are in operation in many war areas, has its main plant in San Diego, Calif. At a plant in Fort Worth, Tex., it produces the Liberator Express, giant transport version of the Liberator bomber. The company operates modification centers at Tucson, Ariz., and Elizabeth City, North Carolina, and the Stout Research Division at Dearborn, Mich. During 1943 it also will be producing at New Orleans, Louisiana, the new P4Y flying boat, said to be "the fastest boat in the world".

Vultee now is completing at its Vultee Field, Calif., plant near Los Angeles, the largest number of military training planes of a single type ever placed by the United States Army. There it also makes Navy training planes. At a plant at Nashville, Tenn., the Vengeance dive bomber is built and the Stinson Division at Wayne, Mich., makes Sentinel liaison planes, known as "flying jeeps", and Reliant instrument training planes. A wholly-owned subsidiary, Intercontinent Aircraft Corp. makes parts at Miami, Fla. Vultee also operates a modification center at Louisville, Ky., and a manufacturing research unit at Detroit. The company is preparing a plant at Allentown, Pa., for production of a Navy torpedo plane.

PILOTS PREPARING FOR 40,000-FOOT COMBAT LEVEL

PILOTS as well as engines must be "souped up" to take the Republic P-47 fighter plane into the stratosphere where the rarefied air will produce aeroembolism (aerial equivalent of the diver's "bends") if pilots have too much nitrogen in their bloodstreams. Hence, before takeoffs, pilots adjust oxygen masks to their faces and mount stationary bicycles, pedaling them for half an hour to speed up the denitrogenation of their blood.

When the "ride" is completed, the pilot must avoid breathing natural air, since a single breath would require 8 minutes on the bicycle. From flight office to cockpit, the pilot keeps supplied with oxygen from a small portable bottle. Once in the plane, he holds his breath for the 10 seconds needed to connect his mask to the plane's oxygen supply. At sea level the bloodstream contains 97 per cent oxygen, but this drops to 65-70 per cent at 20,000 feet, still further at the 40,000-foot combat level of the P-47.

Canadian Steel Strikers Return On "Truce" with Government

TORONTO, ONT.

STEEL workers on Jan. 25, voted to return to work at the plant of Dominion Steel & Coal Corp. Ltd., Sydney, N. S. The vote was 2178 to 734 in favor of accepting temporarily the government's proposed settlement and setting a 30-day deadline for granting their full demands. The three-to-one referendum vote of the United Steel Workers of America local that sent the men back to their jobs carried with it the stipulation that a new strike would be called in 30 days unless their original proposals were met.

Trenton workers voted to remain out until their plants are classified as basic steel producers, which would give them the same wage bargaining rights as the men at Sydney and Sault Ste. Marie. Members of the Algoma local of the United Steel Workers of America, voted to remain on strike at the Algoma Steel Corp. Ltd., Sault Ste. Marie. However, the opinion seems to be that following the vote at Sydney they may adopt a similar plan and return to their jobs. The men at Sydney and Trenton in Nova Scotia walked out Jan. 12 and were followed by the Sault Ste. Marie workers on the 14th.

The government's compromise plan was endorsed by national officers of the USWA. It provides for immediate establishment of a guaranteed 55-cent basic wage rate at Sydney and Sault St. Marie, retroactive to Nov. 1, to include the cost-of-living bonus. However, through decline in the cost-of-living bonus the rate is not to fall below 55 cents per hour. The union may apply for a bonus in addition to this figure. With steel to be designated as a national industry, the new application would be made to the National War Labor Board, which also would hear requests for other wage adjustments. Another clause granted was implementation of the Barlow commission's majority report, which calls for some leveling-up in certain wage classifications. National union officers urged the strikers to accept the new proposals.

Labor Minister Mitchell labeled the strike as "undoubtedly illegal." Under the Wartime Wages Control Order, P.C. 5963 of July 10, 1942, basic wages in Canada were established to cover the spread of maximum and minimum wages paid during the four years previous to Nov. 15, 1941, but wages could not be extended or reduced below these levels without approval of the NWLB.

If the national board finds that basic scale of wage rates paid by an employer Nov. 15, 1941, is low as compared with the ranges of wage rates prevailing for the same or substantially similar jobs in the locality, it may direct such increase as it finds fair and reasonable. The national board may authorize or direct any employer to change a range of wage rates.

Any change in basic wage rates comes under the direct jurisdiction of the national board, and individual companies or employers are not permitted to make a decision and any increase or decrease is out of their hands. The national board also may direct any company or employer to pay a cost-of-living bonus, calculated on the cost-of-living index.

In cases where an agreement between labor and employers or labor and the National War Labor Board, cannot be reached, labor unions or representatives have recourse to a board of conciliation whose decisions are supposed to be final. However, in the case of the steel workers involved in the recent strikes, which closed down approximately 65 per cent of Canada's steel capacity, the unions refused to accept the decision of the majority report and walked out, demanding acceptance of the minority report.

WORKS COMMITTEES "TO LIVE LONG AFTER WAR"

The Labor-Management Committee movement, organized to American war production, will live long after this emergency, is the forecast of William G. Marshall, chairman, Labor-Management Committees of the War Production Board and vice president of the Westinghouse Electric & Mfg. Co., Pittsburgh.

If the impetus provided by the committees can be carried into peacetime production activities after the war, both labor and management will benefit immeasurably, Mr. Marshall, said in a speech at a War Production Teamwork Dinner in Pittsburgh.

"I spoke of labor-management committees as a movement," Mr. Marshall continued. "I believe it to be just that. The fundamental underlying principle is that Labor-Management Committee work goes to the very heart of labor-management co-operation. In my judgment the movement, whether designated by that name or some other, will live long after this emergency and on through prosperous and depression years in varying degrees of operation, from possible failure to certain success as economic conditions influence it."

Mr. Marshall, who is in charge of industrial relations at Westinghouse, said the key to success of the committees is

WILLIAM G. MARSHALL

full co-ordination and complete co-operation. "Already 1800 Committees have been formed voluntarily throughout the nation having as their objective, more and better production."

Campaign for Safety To Conserve Manpower

Accident prevention in the interest of conserving manpower continues to receive attention from several directions.

At Chicago last week, industry was warned that unless it solves the accident problem which caused 94,000 deaths and 4,000,000 disabilities last year the government will have to intervene. This warning came from William A. Irvin, former chairman of the United States Steel Corp. and national chairman of the War Production Fund to Conserve Manpower, in addressing the Chicago committee of the latter organization.

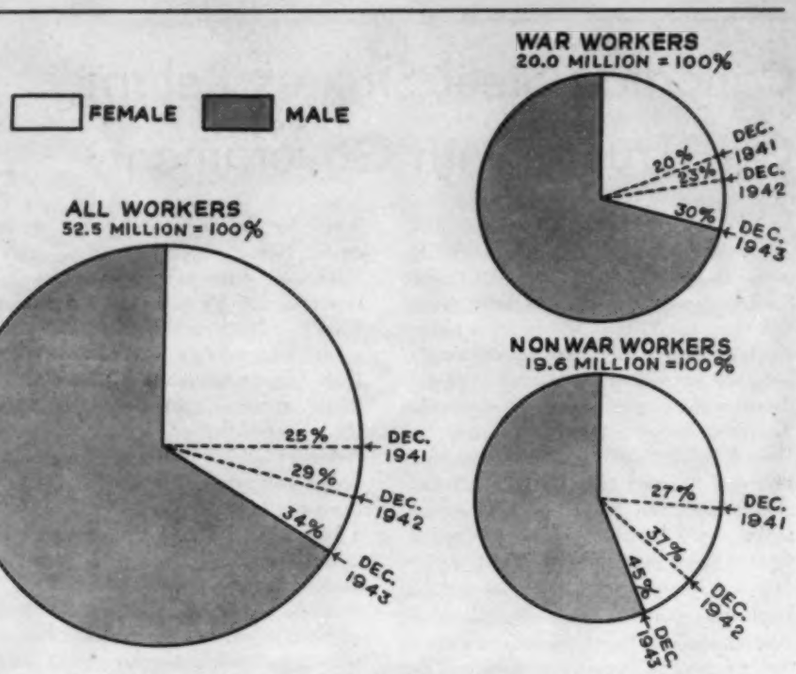
Mr. Irvin and Col. John Stilwell, president of the National Safety Council, are making a five-week swing through 14 major war production centers in the interests of greater national safety consciousness. The War Production Fund is attempting to finance a $5,000,000 expansion of the Safety Council's accident prevention activities.

Regional representatives of the National Committee for the Conservation of Manpower in War Industries were told here Saturday by Labor Secretary Perkins that over a million man-days

were saved for war production last year through her department's accident prevention program.

She reported that about 66 per cent of the 10,755 war plants serviced by this labor department committee reduced accident frequency rates greatly. About 42 per cent of the war plants visited by the department's safety engineers had no formal safety programs, and about 27 per cent had partial programs which were not cutting down accidents.

Recommendations made by the special agents resulted in 545 plants employing full-time engineers, 1075 plants designating an official to head safety organizations and 5230 plants establishing joint labor-management safety committees.



Women will represent more than one-third of the total workers by December, according to present plans. In December, 1941, they represented one-quarter of the total. Added in 1942 and 1943 will be 5,400,000, of whom 4,600,000 will be in war work. In the charts above, data for war and nonwar workers exclude proprietors, self-employed, domestics and farm workers. Charts by National Industrial Conference Board from data by United States Bureau of Labor Statistics and United States Bureau of Employment Security

Buffalo Steel Plants Hire More Women

BUFFALO

STEEL plants in this area are planning to hire hundreds of women for jobs formerly held by men to avert a critical labor shortage.

Bethlehem Steel Co.'s Lackawanna plant will start hiring hundreds of women Feb. 1 as bricklayers' helpers and common laborers in primary steel operations, Edward F. Entwisle, general manager, announced. Republic Steel Corp. is employing women for light work in the mills and may soon place them in pick-and-shovel gangs. The Wickwire Spencer Steel Co. has many women in its wire plant, and would hire more.

"In many jobs around a steel plant physical strength isn't so essential as formerly," said Mr. Entwisle. "Working conditions are much better, as well as far safer. As a result, there are a number of types of steel plant work which in the present emergency women should be able to perform satisfactorily.

"Furthermore, the National Safety Council today ranks the steel industry close to the top of the list among representative industries as a safe place to work. All women employed in the steel plant will naturally be assigned as far as possible to work in locations where the safety hazards are at a minimum.

"The Lackawanna plant has an immediate need for several hundred additional workers for jobs of a type for which in our present emergency women should be able to qualify."

In addition to bricklayer helpers, Bethlehem plans to hire women to replenish the ranks of plant cleanup squads which have been thinned by enlistments or transfers to other work. Other jobs for women will be as operatives on a "dip" painting line for finished war materia'

Small lathes are completely assembled and tested in this "all-women" department at Lodge & Shipley Machine Tool Co., Cincinnati. All operations from scraping of the lathe beds to final tests and run-off, including positioning of parts for assembly by a woman crane operator (not shown in photo), are performed here by women previously trained in the company's regular assembly department

War Firms Cited for Outstanding Production

The Navy and War Departments last week announced award of joint "E" pennants to the following companies:

Borg-Warner Corp., Detroit, and Cleveland.
Clark Equipment Co., Battle Creek, Mich.
Columbian Steel Tank Co., Kansas City, Mo.
Crouse-Hinds Co., Syracuse, N. Y.
Eclipse Counterbore Co., Detroit.
General Electric X-Ray Corp., Chicago.
General Motors Corp., Inland Mfg. Division and Moraine Products Division, Dayton, O.
Illinois Gear & Machine Co., Chicago.
Mid-State Mfg. Co., Waupun Plant, Waupun, Wis.
Oil Well Supply Co., Imperial Works, Oil City, Pa.
Otis Elevator Co., Buffalo.
Phillips-Jones Corp., Barnesboro, Pa.
Rex Mfg. Co. Inc., Connersville, Ind.
Talon Inc., Meadville, Pa.
Thibodaux Boiler Work Inc., Thibodaux, La.
Wadsworth Watch Case Co., Dayton, Ky.
Ware Shoals Mfg. Co., Ware Shoals, S. C.
Weatherhead Co., Cleveland.

Army-Navy pennant is held up for inspection of employes at the Canton, O., works of the Central Alloy District of Republic Steel Corp., Cleveland. Both the Canton and the Massillon works received the award

DeVilbiss Co., Toledo, O., receives "E" burgee for adapting peacetime products to the job of war. Left to right: Allen D. Gutchess, DeVilbiss president; Lieut. Col. T. H. Eickhoff, Cleveland ordnance district; and Paul Kessler, employe representative

Renegotiation Halves Profits of 21 Companies

Margin of profit on war business before taxes of 21 representative companies holding Navy contracts has been reduced from 19.2 per cent of sales to 9.7 per cent, Under Secretary of the Navy Forrestal stated before the Senate Defense Investigating Committee.

The committee also took statements from Under Secretary of War Patterson and Lieut. Com. Arthur G. Rydstrom, operating head of the Maritime Commission.

Mr. Forrestal advocated continuation of the renegotiation system for scaling down excessive profits as against any taxation or profit-limitation method. Mr. Patterson recommended changes in the present law to eliminate from renegotiation contracts for raw materials, standard commercial fabricated articles ordinarily sold for civilian use, and articles used for general operation of a contractor's plant. He also suggested that contractors be exempt from renegotiation if their overall war orders do not exceed a total of $500,000. Present exemption figure is $100,000.

Increased reliance on mechanized equipment as a result of extensive drafting of manpower for armed services accounts in large measure for the unprecedented increase in installed horsepower of American factories of 8,500,000 horsepower, to 59,000,000 horsepower at the end of 1942, according to *Survey of Current Business*.

WPB Halts Non-War Construction To Free Equipment, Materials

Construction projects costing $1,214,830,879 were halted in the last 12 weeks to curtail non-war work, and to free materials, equipment, and other resources, the War Production Board stated last week.

Many of the projects were halted by programming agencies and others through the WPB's revocation of priorities. Greatest savings resulted in the stoppage of WPA projects, power and irrigation projects, and less essential Army and Navy projects.

Many of the jobs halted will be started after the war to take up the shock of reverting to peacetime economy, it was said. Other projects are being studied and further curtailment is expected.

MEN of INDUSTRY

M. C. MORGAN

A. F. DOBBRODT

J. M. ZIMMERMAN

EVERETT F. CLARK

M. C. Morgan, formerly field service engineer, has been named assistant Pittsburgh division sales manager, A. M. Byers Co. He has been associated with the Byers company since 1923.

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A. F. Dobbrodt has been named southern district manager for Carboloy Co. Inc., Detroit, with headquarters at 1719 Comer building, Birmingham, Ala. Associated with Carboloy since 1929, Mr. Dobbrodt has been active in design, sales and servicing of Carboloy cemented carbide tools in the Chicago, Milwaukee, Rochester, N. Y., and Cleveland areas.

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James R. Hewitt has been elected vice president, American Manganese Steel Division, American Brake Shoe & Foundry Co., Chicago.

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H. L. Chamberlain is technical advisor on tubes and pipes to the British Raw Materials Mission, with headquarters in Washington.

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F. B. Lounsberry, vice president in charge of manufacturing for all plants of Allegheny Ludlum Steel Corp., will henceforth make his headquarters at the company's general offices in Brackenridge, Pa.

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Charles W. Test has been appointed district sales manager at Philadelphia for Youngstown Sheet & Tube Co., with offices at 1400 South Penn Square, Philadelphia. Mr. Test succeeds the late **H. E. Richardson.**

—o—

Glenn L. Martin, president, Glenn L. Martin Co., has been elected president, Aircraft War Production Council Inc. **J. Carlton Ward Jr.,** president, Fairchild Airplane & Engine Corp., has been elected vice president, and **Harold E. MacDonald,** executive assistant to the director of engineering, Curtiss-Wright Airplane Division, chairman of the advisory committee on engineering and standards.

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J. M. Zimmerman has been named staff manager for the Pacific Coast district, manufacturing and repair department, Westinghouse Electric & Mfg. Co., with headquarters in Emeryville, Calif. Associated with the company more than 20 years, Mr. Zimmerman had been maintenance supervisor at Chicago since 1927.

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George H. Stein, general foundry superintendent, Acme Pattern & Tool Co., Dayton, O., has been promoted to vice president and assistant general manager in charge of all Acme operations. **A. J. Fischer** succeeds Mr. Stein as general foundry superintendent.

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A. W. Hood, assistant to vice president in charge of manufacturing operations, American Bridge Co., has been presented with the 50-year Gary service medal. He began his career Jan. 25, 1893, as an office boy at the Athens plant of Union Bridge Co. which was merged with American Bridge in 1900.

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E. N. Twogood has been appointed engineer, gear department, General Electric Co., Lynn, Mass., succeeding **A. A. Ross,** who has retired after 48 years of service with the company. Mr. Twogood has been executive assistant to Mr. Ross since 1923.

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Louis G. Bissell has been elected chairman of the board, Mack Trucks Inc., Long Island City, N. Y. A member of the law firm of Chadbourne, Wallace, Park & Whiteside, Mr. Bissell has served Mack Trucks for many years as a director and counsel. **Charles T. Ruhf** has been elected president of Mack Mfg. Corp. and executive vice president of the parent company, Mack Trucks Inc. Mr. Ruhf was formerly operating vice president in charge of factories and has been with the company since 1912.

—o—

Everett F. Clark has been appointed marine manager, eastern district, Westinghouse Electric & Mfg. Co. The past ten years he has held various positions in the company's Transportation and Marine Sales Divisions in New York.

James Clarke has been named assistant to comptroller of Westinghouse. The past eight years he has been a member of the accounting firm of Haskins & Sells, Pittsburgh.

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Paul W. Johnson, acting superintendent since June, 1941, Farmall Works, International Harvester Co., Rock Island, Ill., has been appointed superintendent. He joined the company in 1933 as a tool designer. **W. W. Wilson,** second assistant superintendent, succeeds Mr. Johnson as assistant superintendent.

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Walter Moehlenpah has been appointed field welding engineer for Progressive Welder Co., Detroit, covering Missouri, southern Illinois, western Indiana, southeast Kansas, southeast Nebraska and southwest Iowa. Heretofore he has been in charge of marketing the Frostrode refrigerating units designed for use with resistance welding equipment.

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Paul P. Johnson has been named manager of a new aircraft accessories division, Thompson Products Inc., Cleveland. **Donald E. Beaton** has been named general superintendent of the new division. Since 1939 Mr. Johnson has been patent engineer and assistant to **A. T. Colwell,** vice president.

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H. K. Bourne, vice president and director, Oglebay, Norton & Co., Cleve-

land, has retired. Associated with the company since 1893, Mr. Bourne was a partner from 1917 until 1924 when the company was taken over by the corporation of the same name. At that time he was elected vice president and a director.

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J. Wesley Cable, research and development engineer, Induction Heating Corp., New York, has assumed the added responsibilities of general sales manager.

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T. Albert Potter, president, Elgin National Watch Co., Elgin, Ill., has been elected a director, Illinois Manufacturers' Association.

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Wallace Patten Cohoe, consulting chemist of New York, has been nominated for the presidency of the Society of Chemical Industry, Brooklyn, N. Y. Election of officers will take place at a meeting in July in England.

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Charles R. Fay, director of Employe Accounts Division, Westinghouse Electric & Mfg. Co., Pittsburgh, has been granted a leave of absence to help develop plans and procedures which will be required to administer the materials control plan of the War Production Board, Washington.

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Paul Dyer Merica, vice president, International Nickel Co., and **Essington Lewis,** director general of aircraft production and munitions for the Commonwealth of Australia, have been elected to honorary membership in the American Institute of Mining and Metallurgical Engineers, New York.

J. WESLEY CABLE

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Howard L. Hill has been appointed eastern representative for American Pulverizer Co., St. Louis, with headquarters at 101 Park avenue, New York.

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Charles H. Eisenhardt has been appointed assistant manager, Electrical, Wire Rope and Construction Materials Sales Division, American Steel & Wire Co., Cleveland, succeeding **R. L. Rhodes,** resigned. Associated with the company 17 years in various capacities, Mr. Eisenhardt has been special sales representative in Washington since last August.

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L. C. Rathsburg has been elected vice president, Lakeside Malleable Castings Co., Racine, Wis. He has been associated with the company for the past 20 years in charge of the Chicago office and will continue to be located at 122 South Michigan avenue, Chicago.

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Brace H. Sibley, associated with manufacturing departments of Champion Spark Plug Co., Toledo, O., for over 20 years, has been appointed factory manager. Other recent appointments include **B. O. Black,** in charge of production planning and control; **J. A. Soden,** assistant to factory manager; **John Nolan,** production engineer; and **J. H. Beatty,** supervisor of employe relations. **C. E. Dewar,** formerly vice president in charge of production, has retired after 28 years of continuous service with the company.

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Harry Edmund Newell, assistant chief engineer, National Board of Fire Underwriters, New York, has been awarded the James Turner Morehead medal for 1941 by the International Acetylene Association for his "leadership in developing standards for installation and operation of acetylene equipment and systems."

OBITUARIES . . .

W. W. Lewis, assistant vice president, American Rolling Mill Co., Middletown, O., died Jan. 23 in Dayton, O. Associated with Armco 25 years he was formerly general manager of the London branch of Armco International Corp. At one time he was employed by Jones & Laughlin Steel Corp.

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James E. Mills, 63, president, Smith & Mills Machine Tool Co., Cincinnati, died Jan. 23, in Cincinnati. He had been president since 1913.

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Michael L. McGuire, foundry consultant, George F. Pettinos Inc., Philadelphia, died in that city, Jan. 18.

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Charles J. Bender, 75, president, Ahlberg Bearing Co., Chicago, died in that city, Jan. 19. With Karl Ahlberg, he founded the company in 1908.

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Elijah T. Harris, 90, president, Harris & Reed Co. and Payson Mfg. Co., Chicago, died in that city, Jan. 20. He founded the former company in 1875 and had been associated with the latter since 1905.

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William E. Robinson, 59, president, Headford Bros. & Hitchins Foundry Co., and president-treasurer, Corn Belt Mfg. Co., makers of agricultural implements, Waterloo, Iowa, died in that city recently.

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John C. Maher, 63, manager, Ohio Foundry Co., Cleveland, died Jan. 22, in that city, from injuries sustained in an automobile accident.

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Charles T. Draper, 87, chairman of the board and founder, Draper Mfg. Co., Cleveland, died in that city, Jan. 24. Mr. Draper was one of the organizers and the first president of the Steel Barrel Manufacturers Association.

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Howard M. Raymond, 69, president emeritus, Illinois Institute of Technology, Chicago, died at his home in Grass Lake, Mich., Jan. 24. He retired as president of Armour Institute of Technology, now Illinois Institute, ten years ago.

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Albert J. Hauser, 77, one of the founders of Hauser Stander Tank Co., Cincinnati, died Jan. 14, in St. Petersburg, Fla. He retired ten years ago.

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Henry G. Herget, 80, industrialist, and a past president of the Illinois Manufacturers' Association, died at his home in Pekin, Ill., Jan. 5.

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Walter C. Keys, 57, chief engineer of the new products department, Mechanical Rubber Division, United States Rubber Co., Detroit, died in that city, Jan. 26. At one time executive engineer for Standard Parts Co., Cleveland, and later sales engineer for Gabriel Snubber Co., he had been active with United States Rubber since 1926.

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Adolph John Kohler, 59, general superintendent, Wood Newspaper & Machinery Corp.'s plant in Plainfield, N. J., for 16 years, died recently at his home in Fanwood, N. J.

Electrical Engineers Told About New Type of Motor

A new alternating-current motor, which eliminates necessity for direct-current equipment, was announced at the annual meeting of the American Institute of Electrical Engineers in New York, Jan. 25-29.

The motor has many applications, especially in machine tool operations. Three years of testing at Yale University, it was stated, demonstrated that the motor permits an operator to slow down his lathe without changing gears, belt or pulley ratios. It has a special control circuit that helps to reduce the amount of equipment required for such a device. Cost was reported as "less than half that of any other combination of machines which might perform similarly."

Reversal of the motor is accomplished quickly. When used as a brake, the motor will stop any machine it drives more rapidly than usually is possible. A high starting torque without the usual disturbances which occur in line voltage also is claimed for it.

Chicago Foundrymen Announce Lecture Series

American Foundrymen's Association, Chicago, begins on Feb. 3 the second year of a four-year educational program with a series of six lectures designed to aid aspiring young men.

Last year the lectures were broad and of an introductory nature but this year will be more advanced and will deal with current foundry practice. All lectures will be handled as panel discussions with a technical chairman and several authoritative speakers.

Meeting will be at 7:15 Wednesday evenings in the Peoples Gas Light & Coke Co. auditorium, 122 South Michigan avenue. J. C. Thomas, Whiting Corp., Harvey, Ill., is secretary. Details of the meetings announced follow:

Lecture 1, Feb. 3—"Melting Methods and Equipment—All Kinds." Technical chairman: A. W. Gregg, foundry engineer, Whiting Corp., Harvey, Ill. Speakers: "Blast Furnace," Roy A. Lindgren, Wisconsin Steel Co., Chicago; "Iron and Malleable Melting," W. R. Jaeschke, field engineer, Whiting Corp., Harvey, Ill.; "Steel Melting," H. A. Forsberg, general superintendent, Continental Roll & Steel Foundry Co., East Chicago, Ind.; "Nonferrous Melting," P. J. Myall, sales manager, Fisher Furnace Co., Chicago.

Lecture 2, Feb. 17—"Cast Iron and Malleable Iron Melting Practices." Technical chairman: C. E. Mate, foundry superintendent, Greenlee Foundry Co., Chicago.

Lecture 3, March 3—"Steel Melting Methods and Equipment." Technical chairman: L. H. Hahn, metallurgical superintendent, Sivyer Steel Casting Co., Chicago.

Lecture 4, March 17—"Nonferrous Melting Practices," Technical chairman: Chester Faunt, Christensen & Olsen Foundry Co., Chicago.

Lecture 5, March 31—"Refractories for Furnaces." Technical chairman: John Owen, sales engineer, Harbison-Walker Refractories Co., Chicago.

Lecture 6, April 14—"Ladle Refractories and Ladle Practice." Technical chairman: Grif Kennelley, General Refractories Co., Philadelphia.

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Triple Mill Supply—Convention will be held in Netherland Plaza Hotel, Cincinnati, May 9-12. The three associations are the American Supply and Machinery Manufacturers Association, the Southern Supply and Machinery Distributors Association and the National Supply and Machinery Distributors Association. R. Kennedy Hanson, 1108 Clark building, Pittsburgh, is manager of the manufacturers' group.

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American Gas Association—Two forums, one on limitations order L-31 and L-174 as they apply to all industrial and commercial gas situations and the other on commercial and industrial equipment, will feature the war conference on commercial and industrial and commercial gas at Hotel Statler, Detroit, March 11-12.

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Eastern States Blast Furnace and Coke Oven Association—Morning and afternoon sessions will be held in William Penn hotel, Pittsburgh, Feb. 12. Coke oven and blast furnace sections will meet separately at 10 a. m. and jointly at 2 p. m. The meeting will close with a dinner at 7 p. m.

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American Institute of Mining and Metallurgical Engineers — L. F. Reinartz, manager, Middletown district, American Rolling Mill Co. will present the Howe Memorial Lecture at the annual meeting of the iron and steel division, Engineers Societies building, New York, Feb. 14-18. He will trace the development of research in the steel industry in past 40 years.

Patterson Confident 1943 Objectives Can Be Met

A nation that can show the progress that we made in 1942, in field and factory, need have no doubts as to its ability to meet the objectives for 1943. So stated Under Secretary of War Robert P. Patterson in addressing 600 midwestern business executives and manufacturers at a War Industries dinner at the Union League Club, Chicago, Jan. 25.

"The schedules will be stiffer, but our experience has been broken," he asserted. "The display of more energy here and there, more patience with rationings and restrictions, more efficient production per man and machine, better team work between management and labor, between government and business and among the government agencies themselves, and the job will be made easier."

The dinner was sponsored by the Technological Institute of Northwestern University, Evanston, Ill.

Commenting on the cost of equipping an army, and the situation which makes it necessary to renegotiate many contracts, Mr. Patterson said. The North African expedition carried more than 700,000 different items of equipment and supply.

"When Pearl Harbor thrust us into war, the Army did not know precisely what each of these items used in General Eisenhower's landing was going to cost. Neither did industry."

"The army and industry both know, for instance, that we needed a certain kind of gun, needed it in a hurry. There was no way to figure out the cost to the last penny or even the last dollar. There was not sufficient experience in the production of the gun on a quantity basis on which to compute a fair price—fair to the producer and fair to the government. After enough of the guns had been built, the cost became more readily apparent. So, with a reasonable profit needed, we can now come to a fair cost for these guns."

Additional Advisory Committees Appointed

New Industry Advisory Committees recently appointed by the War Production Board include:

Resistance Welding Controls

Members are: E. R. Beck, Square D Co., Milwaukee; J. Dawson, Raytheon Mfg. Co., Waltham, Mass.; R. S. Fulton, National Time & Signal Corp., Detroit; G. W. Garman, General Electric Co., Schenectady, N. Y.; S. M. Humphrey, Taylor-Winfield Corp., Warren, O.; T. R. Lawson, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.; Maurice Sciaky, Sciaky Brothers Corp., Chicago; L. F. Stander, Weltronic Corp., Detroit; W. H. Williams, Clark Controller Co., Cleveland; and F. A. Wright, Cutler-Hammer Inc., Milwaukee.

Steam Turbines and Turbine Generators

Members: W. K. Brown, Joshua Hendy Iron Works, San Francisco; C. S. Coggeshall, General Electric Co., Schenectady, N. Y.; G. H. Cox, Westinghouse Electric & Mfg. Co., Harrison, N. J.; T. Cruthers, Worthington Pump & Mach. Co., Harrison, N. J.; John F. Hayes, Dean Hill Pump Co., Anderson, Ind.; W. J. Healy, De Laval Steam Turbine Co., Trenton, N. J.; H. C. Hult, Coppus Engineering Co., Worcester, Mass.; and C. C. Jordon, Allis-Chalmers Mfg. Co., Milwaukee.

Salvage materials, including scrap steel and other metals, tires, tubes and scrap rubber, clothing and miscellaneous items, are being collected at overseas bases of the United States Army and returned to this country for use in the war effort, the War Department announces. Already about 1,348,000 pounds of brass cartridge cases have been returned. Where operations permit, scrap will be gathered from battlefields.

Further Spreading of War Contracts Likely

PROSPECTS for the smaller war plants obtaining a greater share of war contracts are improving. More important action to control strikes, slow-downs and absenteeism also is being considered in Washington.

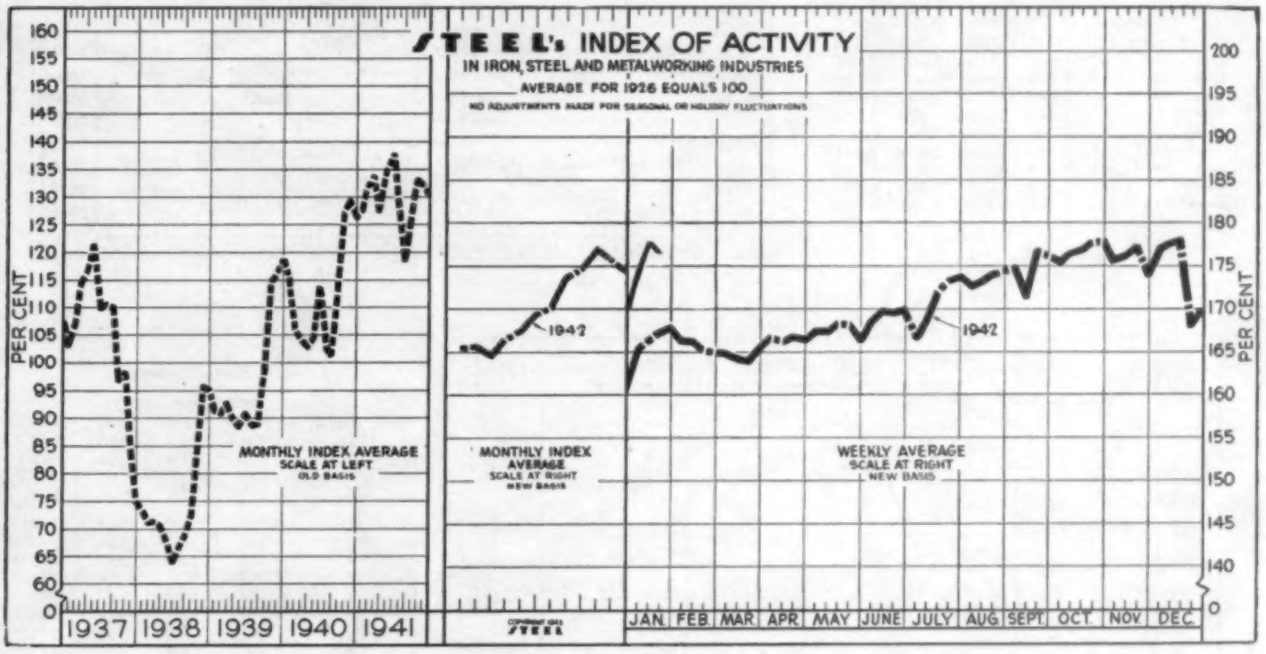
Little change is noted in the over-all volume of industrial production. Output of munitions tends steadily upward; while civilian production, curtailed by government restrictions and by labor and material scarcities, is well below last year.

During the week ended Jan. 23, STEEL's index of activity stood at 176.8. This represents a decline of 1.1 point from the 177.9 level recorded in the preceding week.

Steel ingot production held steady at practical capacity during the week of Jan. 23, limited only by necessary open hearth furnace repairs. The national rate of 99 per cent in that period compares with 97 per cent in the corresponding week of 1942. Adverse weather conditions have retarded movement of steel scrap in recent weeks. However, steel plants have sufficient stocks to make it possible to sustain capacity output over the winter months.

Electric power consumption is currently running about 15.5 per cent above a year ago. During the week ended Jan. 23 power output totaled 3,974,202,000 kilowatts, or just slightly below the all-time peak of 3,975,873,000 kilowatts recorded during the week ended Dec. 19, 1942.

Revenue freight carloadings declined slightly during the latest period to an estimated total of about 695,000 cars. Severe winter weather conditions in some sections of the country accentuated the decline. Freight traffic currently is substantially below a year ago.



STEEL's index of activity declined 1.1 points to 176.8 in the week ending Jan. 23:

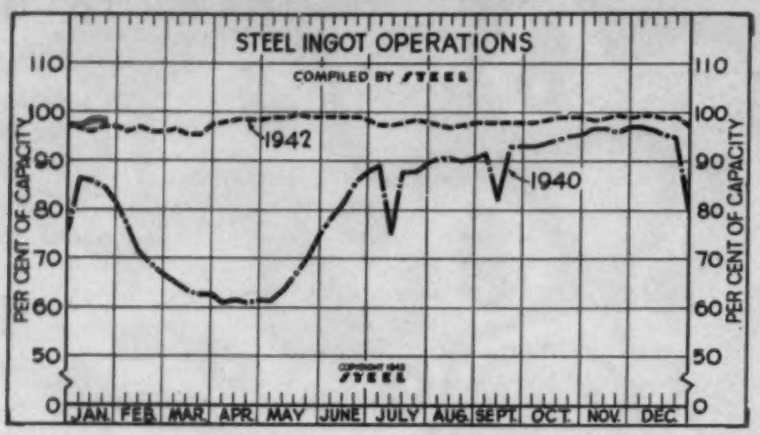
Week Ended	1943	1942
Jan. 23	176.8[1]	167.4
Jan. 16	177.9	166.6
Jan. 9	175.7	165.6
Jan. 2	170.0	161.0
Week Ended	**1942**	**1941**
Dec. 26	167.8	120.5
Dec. 19	178.0	132.9
Dec. 12	177.6	134.0
Dec. 5	177.1	133.4
Nov. 28	174.0	132.2

[1] Preliminary.

Mo. Data	1942	1941	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931
Jan.	165.7	127.5	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1
Feb.	165.6	132.3	105.8	90.8	71.1	106.8	84.3	82.0	75.9	48.2	55.3	75.5
March	164.6	133.9	104.1	92.6	71.2	114.4	87.7	83.1	78.9	44.5	54.2	80.4
April	166.7	127.9	102.7	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0
May	167.7	134.8	104.6	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6
June	169.4	138.7	114.1	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1
July	171.0	128.7	102.4	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3
Aug.	173.5	118.1	101.1	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4
Sept.	174.8	126.4	113.5	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3
Oct.	176.9	133.1	127.8	114.9	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.3
Nov.	175.8	132.2	129.5	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.5	54.4
Dec.	174.1	130.2	126.3	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.8

Note: Weekly and monthly indexes for 1942 and 1943 have been adjusted to offset the forced curtailment in automobile production and to more accurately reflect expanding steel production

THE BUSINESS TREND



Steel Ingot Operations

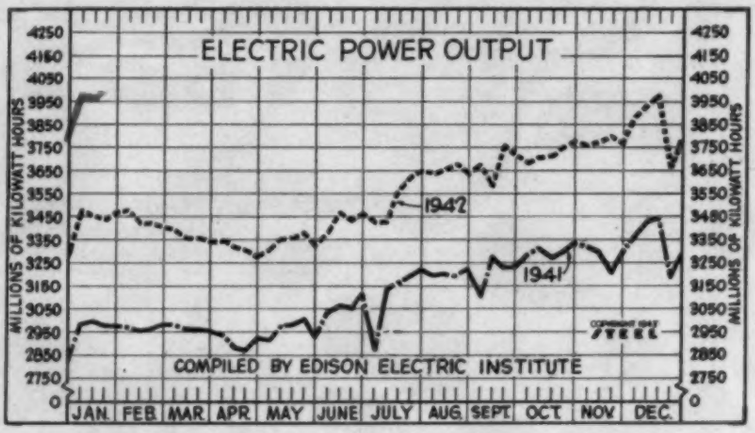
(Per Cent)

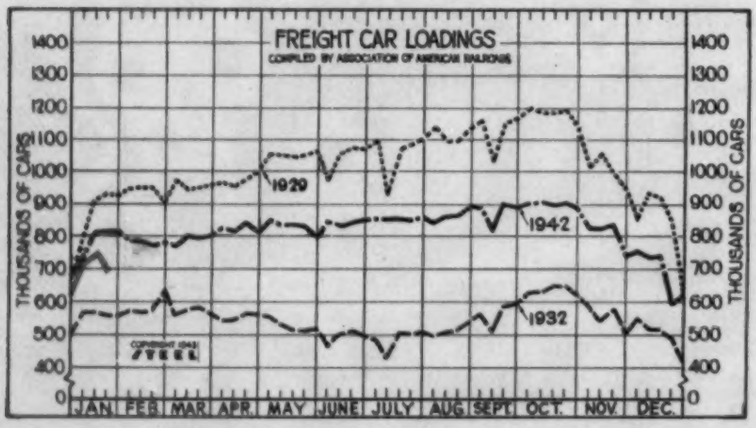
Week ended	1943	1942	1941	1940
Jan. 23	99.0	97.0	95.5	81.5
Jan. 16	99.0	96.0	94.5	84.5
Jan. 9	97.5	96.5	93.0	86.0
Jan. 2	97.5	97.5	92.5	86.5
Week ended	**1942**	**1941**	**1940**	**1939**
Dec. 26	99.0	93.5	80.0	75.5
Dec. 19	99.0	97.5	95.0	90.5
Dec. 12	99.5	97.5	95.5	92.5
Dec. 5	99.5	96.5	96.5	94.0
Nov. 28	99.0	95.0	97.0	94.0
Nov. 21	99.5	95.5	97.0	96.5
Nov. 14	99.0	97.0	96.0	96.5
Nov. 7	96.5	97.5	96.5	95.0
Oct. 31	99.0	95.5	96.5	93.0
Oct. 24	99.0	95.5	95.5	92.0
Oct. 17	99.0	96.5	95.0	91.0

Electric Power Output

(Million KWH)

Week ended	1943	1942	1941	1940
Jan. 23	3,974	3,440	2,980	2,661
Jan. 16	3,952	3,450	2,996	2,674
Jan. 9	3,953	3,473	2,985	2,688
Jan. 2	3,780	3,299	2,831	2,558
Week ended	**1942**	**1941**	**1940**	**1939**
Dec. 26	3,656	3,294	2,757	2,465
Dec. 19	3,976	3,449	3,052	2,712
Dec. 12	3,936	3,461	3,004	2,674
Dec. 5	3,884	3,368	2,976	2,654
Nov. 28	3,766	3,295	2,932	2,605
Nov. 21	3,795	3,205	2,839	2,561
Nov. 14	3,776	3,305	2,890	2,587
Nov. 7	3,762	3,326	2,858	2,589
Oct. 31	3,775	3,339	2,882	2,609


ELECTRIC POWER OUTPUT
MILLIONS OF KILOWATT HOURS
1942
1941
COMPILED BY EDISON ELECTRIC INSTITUTE
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.



Freight Car Loadings

(1000 Cars)

Week ended	1943	1942	1941	1940
Jan. 23	695†	818	711	649
Jan. 16	755	811	703	646
Jan. 9	716	737	712	668
Jan. 2	621	674	614	592
Week ended	**1942**	**1941**	**1940**	**1939**
Dec. 26	592	607	545	550
Dec. 19	743	799	700	655
Dec. 12	740	807	736	681
Dec. 5	760	833	739	687
Nov. 28	844	806	729	689
Nov. 21	836	799	733	677
Nov. 14	827	884	745	771
Nov. 7	829	874	778	786
Oct. 31	891	895	795	806

†Preliminary.

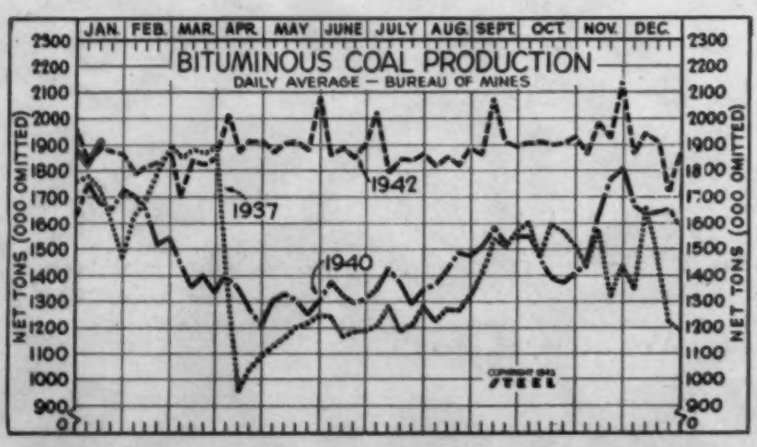
Bituminous Coal Production

Daily Average

Net Tons (000 omitted)

Week ended	1943	1942	1941	1937
Jan. 16	1,917†	1,883	1,609	1,731
Jan. 9	1,833	1,842	1,691	1,780
Jan. 2	1,860	1,960	1,762	1,764
Week ended	**1942**	**1941**	**1940**	**1937**
Dec. 26	1,720	1,632	1,591	1,230
Dec. 19	1,913	1,792	1,656	1,477
Dec. 12	1,944	1,817	1,645	1,669
Dec. 5	1,853	1,813	1,636	1,847
Nov. 28	2,149	1,958	1,674	1,444
Nov. 21	1,925	1,615	1,815	1,318
Nov. 14	1,989	1,988	1,773	1,580
Nov. 7	1,867	1,826	1,632	1,433

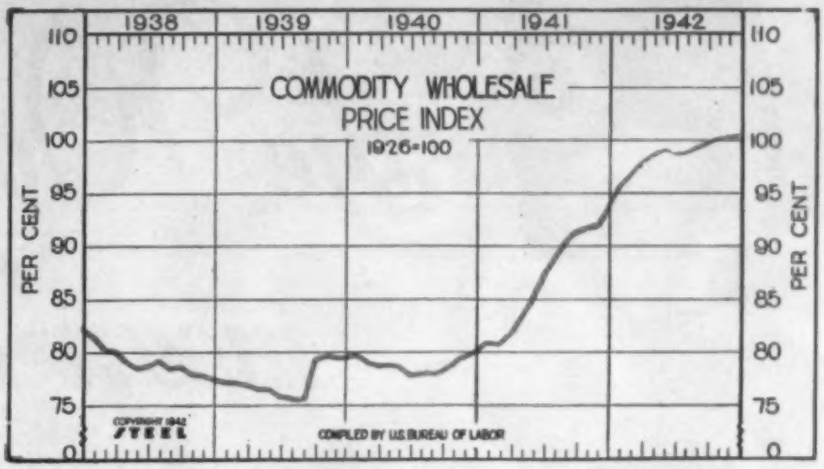
†Preliminary.

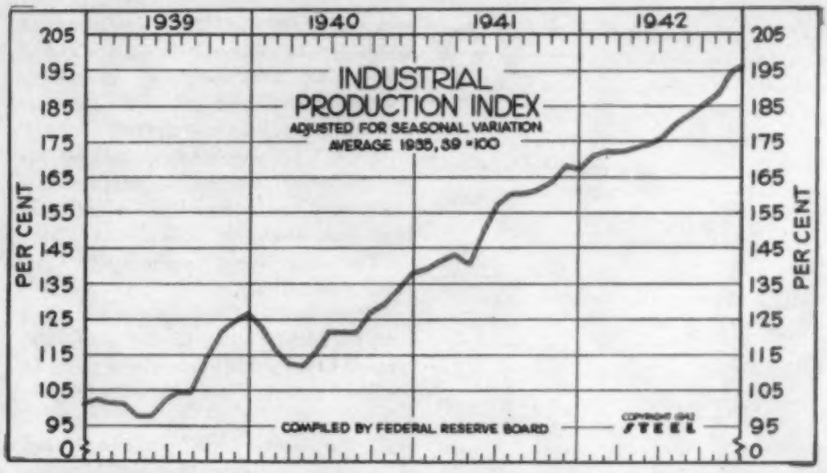

BITUMINOUS COAL PRODUCTION
DAILY AVERAGE — BUREAU OF MINES
NET TONS (000 OMITTED)
1942
1937
1940
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.

All Commodity
Wholesale Price Index
U. S. Bureau of Labor

(1926 = 100)

	1942	1941	1940	1939	1938
Jan.	96.0	80.8	79.4	76.9	80.9
Feb.	96.7	80.6	78.7	76.9	79.8
March	97.6	81.5	78.4	76.7	79.7
April	98.7	83.2	78.6	76.2	78.7
May	98.8	84.9	78.4	76.2	78.1
June	98.6	87.1	77.5	75.6	78.3
July	98.6	88.8	77.7	75.4	78.8
Aug.	99.2	90.3	77.4	75.0	78.1
Sept.	99.6	91.6	78.0	79.1	78.3
Oct.	100.0	92.4	78.7	79.4	77.6
Nov.	100.3	92.5	79.6	79.2	77.5
Dec.	100.7	93.6	80.0	79.2	77.0
Ave.	98.7	87.3	78.5	77.1	78.6





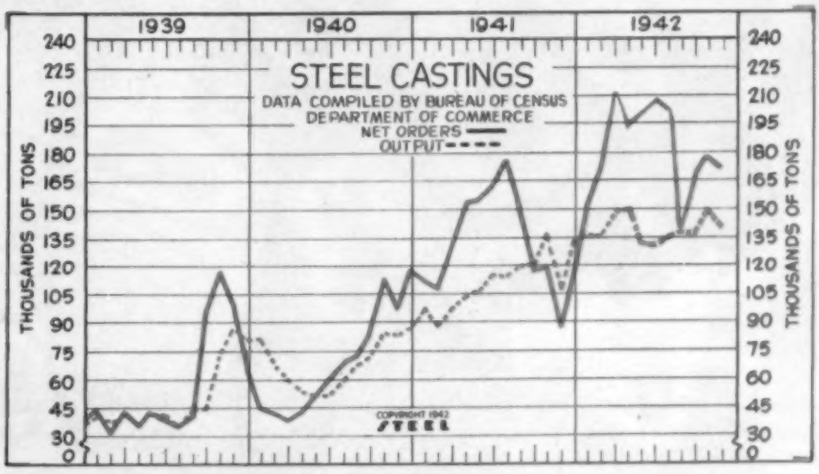
Industrial Production
Federal Reserve Board's Index

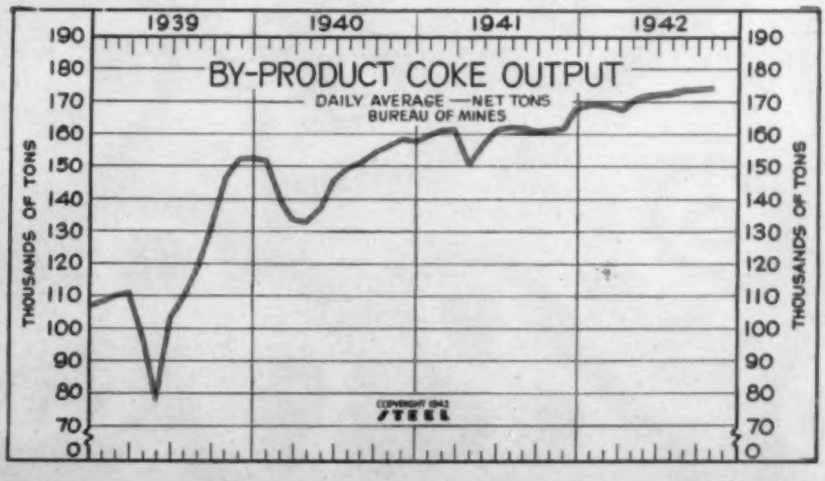
(1935-39 = 100)

	1942	1941	1940	1939	1938
Jan.	171	139	122	102	86
Feb.	172	141	116	101	84
March	172	143	112	101	84
April	173	140	111	97	82
May	174	150	115	97	80
June	176	157	121	102	81
July	180	160	121	104	86
Aug.	183	160	121	104	90
Sept.	185	161	127	113	90
Oct.	189	163	129	121	93
Nov.	191	168	133	124	100
Dec.	196	167	138	126	101
Year Ave.	180.2	154	122	108	88

Steel Castings

	—Net Orders—		—Production—	
	1942	1941	1942	1941
Jan.	150,551	110,579	134,778	94,409
Feb.	179,880	105,125	133,726	84,492
Mar.	211,081	126,140	146,507	95,185
Apr.	191,195	152,007	149,625	101,977
May	199,619	153,143	131,492	104,971
June	208,243	161,512	131,458	113,988
July	201,334	175,892	134,461	112,364
Aug.	140,673	147,316	139,059	117,703
Sept.	171,265	115,066	135,823	118,543
Oct.	175,484	117,516	149,268	135,272
Nov.	169,862	84,534	137,428	104,605
Dec.	.....	113,034	.....	131,518
Tot.	.....	1,561,864	.....	1,316,027





By-Product Coke Output

(Daily Average)

	1942	1941	1940	1939
Jan.	168,508	159,129	151,841	108,611
Feb.	168,414	160,789	138,508	109,923
March	167,733	161,268	133,056	110,921
April	168,960	149,144	132,812	97,155
May	170,187	156,318	136,897	77,304
June	170,593	161,201	145,821	102,991
July	170,244	161,731	149,005	108,542
Aug.	171,443	161,709	151,035	118,260
Sept.	172,110	160,193	154,247	130,144
Oct.	172,211	160,344	156,118	146,019
Nov.	.....	161,116	158,331	152,219
Dec.	.....	167,304	157,743	152,200
Total	.....	160,037	147,157	117,892

the Women mean Business

By GEORGE R. REISS

A NEW YOUNGSTER employed as a welder in Truscon Steel Co.'s big Youngstown, O., fabricating plant took a piece of his handiwork to his foreman the other day.

"Look," he commanded, holding up the piece for inspection. "Mighty nice work, if I say it myself . . . and I've been here only five weeks."

"Yes, nice work," agreed the foreman, "but . . . "

He grasped the lad by the arm, led him to another part of the shop and handed him for his inspection a piece of welded material, an exceedingly fine job.

"Yeah, well done," admitted the youngster grudgingly, "but an old timer, someone who's been here a long time, did that."

"No," corrected the foreman softly. "Not an old timer, but a new comer. *She has been here only three days.*"

And that little incident explains why executives of Truscon Steel Co., Republic Steel Corp.'s big subsidiary which is swamped with important war orders, is so enthusiastic about their new force of women welders; why the plant, which only a couple of months ago employed

Above — All welderettes wear heavy protective clothing as well as safety shoes. Note flameproof sleeve, heavy gloves Ann Morris is wearing

Right — Production line setup in Truscon Steel Co.'s Youngstown plant where more than 150 women welders are already employed. To meet censorship, line was shut down and work in process removed for photo

no women in its shop, soon will have a hard-hitting force of 600 welderettes at work around the clock.

And it further explains why that big plant is meeting and exceeding its heavy production schedules on critical war materials and why, when a top-ranking executive, on learning recently that the company stood to lose 375 employes as a result of the lowering of the selective service age limits, immediately ordered his employment office:

"Go ahead and hire 375 women; and get them now before the supply of good ones is gone."

That policy represents a complete reversal of Truscon executives' attitude toward women welders on the war production lines, just as scores of other American industrialists are changing their prejudices against women workers on such difficult jobs as assembly line and welding work. Truscon really was forced to try the experiment of employing women welders.

Only a few months ago, the company found itself in a bad spot, swamped with a tremendous order for parts for an important war machine. Hundreds of thousands of them were needed . . . and quickly. Each part required welding. Truscon had some welders, but nowhere near enough to handle that job. And selective service was constantly draining off part of the supply.

"Why not try women welders," suggested someone at a conference on the problem. Most of the company executives were not opposed to hiring women although one snorted, "Hrumnumph! Women can't make good welders . . . . not for such a job. They couldn't stand it, couldn't do good work. Women couldn't . . . "

His sentiments were shared by some of the welding foremen in the plant—but they soon discovered they were all wrong; and today they are enthusiastic about their welderettes.

Already the plant has 150 women welders, all trained in the plant and all certified as naval welders; another 150 are in training, while several hundred more are waiting to begin training as soon as facilities are available.

"I've completely changed my mind about them," commented the top-flight executive who originally opposed training the women workers. "They learn as rapidly as men, the quality of their work is beyond question; they are eager to learn—and best of all, there's a good available supply of them. They are eager to work and eager to please, unlike a lot of the men available for training now."

As a result of its experience, Truscon has developed a lot of ideas about the type of women it wishes to train as welders. It does not ask any particular previous working experience—and most of the girls flocking into the employment office previously were beauticians, sales girls, waitresses, housewives, stenographers or secretaries, clerks.

It prefers they be over 21 years of age—so they do not come within state laws preventing younger girls from working shifts; and under 30 years of age, because older women have difficulty in attaining the co-ordination necessary for the work. However, it employs a number of welderettes up to 40 years of age. It prefers slim girls because heavier women are not likely to have the stamina to stay at work on their feet all day long.

"We have discovered that only one out of every 100 applicants fails to have the necessary aptitude and ability to learn the trade," said an employment officer. "But we are taking the applications of all those who look good, even those who appear not particularly well fitted to learn welding."

He pointed out that many are used in other jobs in the plant—sweeping, inspecting and similar work. Soon there will be about 400 women at work in these other jobs in the plant.

The company has fitted up rest rooms through the big shop; has fitted up a section of the plant as the "welding school". Here are several long rows of canvas stalls, one for each student so that the brilliant glare from the welding will not harm other students' eyes.

Each girl is supplied with a welder's helmet and goggles, welding rods and pieces of steel with which to practice. At the outset, the girls are shown a movie of welding which explains all its points. Then some of the most expert welders in the shop are designated as instructors, receiving premium wage rates to teach. They instruct the girls individually on how to hold the welding rods and materials, how to handle the job—and then encourage them to "go to it", inspecting the results from time to time.

Incidentally, the girl students really are eager to learn and get to work on real production. While they are learning, they are paid wages at least double or triple the rates they formerly earned in stores or beauty parlors. Then they receive the same wage rates as men welders when they begin actual production.

Recently a foreman noticed the flickering brilliant flare of welding rods coming from two of the canvas stalls during the half-hour lunch period given the girls. Investigating, he found two trainees at work, practicing some welds.

"It's lunch time," he informed them.

"Sure, I know," explained one of the girls. "But I'm not hungry—and I'm anxious to finish the course. I don't see much sense in wasting the lunch hour if I'm not going to eat."

She immediately turned back to her work. The foreman had to explain that the state law required the company to break their 8-hour day with a 30-minute lunch period, and very reluctantly they finally abandoned the work.

When they finish the course, the women welders are required to take the difficult naval welder's test before they are put to work. Mighty few of the trainees fail to qualify the first time they take the test.

Mighty few have had to be dropped because of unwillingness to apply themselves properly in working with the shopful of men, executives explained.

And once they get on the production line, it is difficult to pick out their work from that done by experienced male welders, some of whom have been employed in the plant for years. The girls are paid bonuses for reaching certain production levels—and their checks also are difficult to distinguish from the male workers' since there is little difference in quantity of production.

One of the problems the plant encountered with the trainees was to get them to wear the proper clothing for the work. Instead of wearing stout safety shoes and heavy work slacks or coveralls and jersey sweaters, some trainees came to work, in spite of instructions to the contrary, wearing fashionable toeless shoes, thin silk dresses or light sports slacks.

"But it required only a few cases of artificial 'sunburn' from the welding equipment to change all that," a supervisor explained. "Thereafter, they wore thick-sold shoes, heavy work slacks or coveralls—and forgot all about the beauty business, forgot all about stopping

(*Please turn to Page* 124)

The Function of specifications In Conservation and Substitution

Section 11 in a Series on Conservation and Substitution

By ARTHUR F. MACCONOCHIE
Head, Department of Mechanical Engineering
University of Virginia
University Station, Va.
And Contributing Editor, STEEL

BELIEVING that a better knowledge and understanding of government specifications would be a definite help to American industry and facilitate war production, we requested Professor Macconochie to prepare this article. After considerable study and with the wholehearted co-operation of the U. S. Army Ordnance Department, he offers this comprehensive explanation in two parts.

This first portion deals with specifications in general and their influence upon conservation efforts. The second part, appearing next week, describes steel specifications and offers a thorough explanation of War Department specification policies. It will include a detailed comparison between WD (War Department) steels and commercial grades.

THE EDITORS.

SPECIFICATIONS are as old as human society. Long before they attained their present formal status, some more or less precise concept of the characteristics possessed by the desired article existed in the mind of the buyer. As the art of writing developed and we entered upon the great manufacturing era of the steel age, the specification appeared in ever widening variety and complexity as steel and other metals and materials wove themselves into the fabric of civilization.

The enginer and designer, faced with the responsibility for safe construction or accuracy and reliability of function must needs follow one or another of several familiar courses open to him and dependent, in some measure, on the nature of the material required. He can and does specify by description of purpose or use, thus placing the entire responsibility upon the vendor. Thus it might be unnecessary to define either the composition or heat treatment of armor plate or armor piercing shell, provided the materials offered satisfied firing tests.

Or again, an industrial buyer might purchase by brand name, granted confidence in the vendor's reputation for quality. In a competitive economy in which materials are readily available and are freely bought and sold, such policies are adequate and satisfactory; but the necessities of total war put a different complexion on the matter. We have become, as it were, one great household in which the contents of the larder and prospects of its replenishment are of vital concern to us all.

Now, therefore, the specification in the hands of the fighting services has become not only an instrument of procurement but also the means of applying most efficiently those materials which are available.

By way of clarifying the basic procedures of the United States Army Ordnance Department in the application of specifications to the vast problem of conserving essential materials, we observe that four types are in use as tools of design and production. These are

Opposite page—Form and dimensions of the part, as laid down in the drawings which form part of the legal documents called specifications, are no less important than chemical and physical characteristics. Here former movie star uses a dial gage. OWI photo by Ann Rosener

Immediate right—Most satisfactory method of checking physical characteristics of a part is to cut a sample from the part (using a hollow drill for example) and then stretch, bend, compress or strike a sudden blow to produce failure. Not only the maximum force required, but the manner in which failure occurs provide essential information. OWI photo by Bransby

Directly above—A specification emanating from a War Department office functions in the laboratory of an aircraft manufacturer. Running a spectrographic test to check purity of a metal. OWI photo by Bransby

View at left—To assure maintenance of physical standards demanded by "specs", the worker himself is put to the test. At irregular intervals, every welder on an Army job must make sample welds. Should they fail on test (as this one has), the welder must produce a satisfactory sample before he is permitted to continue his work. OWI photo by Bransby

Federal Specifications, Emergency Alternate Federal Specifications, United States Army Specifications and Tentative Specifications. These four classes of specifications differ in the amount of co-ordination among agencies of the War Department and other government departments and in the degree of their flexibility.

Federal Specifications developed by co-operative action of all interested departments of the federal government and generally covering materials or articles of a commercial nature. These specifications are prepared and revised by technical committees, each of which deals with one class of materials or purchased items. They are thoroughly co-ordinated with industry and all interested federal agencies; approved by the Director of Procurement of the Treasury Department; and issued by the Federal Specifications Executive Committee.

Because of the length of time required for their preparation and revision, Federal Specifications are prepared only for those materials or articles which are, or can be, standardized in all essential details.

Emergency Alternate Federal Specifications: Some time prior to Dec. 7, 1941—a date which will live long in American history—the Federal Specifications Executive Committee realized that many materials and articles normally in demand under peacetime conditions would not be available at all or at least in inadequate quantities. There were, further, many applications in which the material originally specified would not become part of combat equipment. Consequently the quality in such applications could be reduced without affecting the safety or efficiency of military personnel.

Out of these considerations arose the

(*Please turn to Page* 124)

Fig. 1. (Inset)—Left, light source; right, receiver unit; center, interior of receiver unit. All illustrations from Worner Products Corp., Chicago

Fig. 2—This view shows actual installation of units such as diagrammed in Fig. 4. Units are not aimed at each other but along their respective fence lines AB and BC in Fig. 4. View is before camouflage had been placed to conceal units

Defense Against SABOTAGE, ESPIONAGE is vital to war production effort

By R. E. APPEL
Worner Products Corp.
Chicago

Modern photoelectric equipment affords automatic day-and-night protection to entire plants as well as any particular areas inside the plant. Units can easily be hidden, utilize "black" light so they do not disclose their presence

ONE OF the most difficult tasks of the entire war effort is to get everyone in a peace-loving country thoroughly aroused to its perils. *For several years we have all been reading about total war, yet few of us realize what it means.* Many of us still fail to grasp the significance of the fact that war is no longer confined to a struggle on the battlefield. We think that our armed forces are the only people who are in contact with the enemy—that it is they alone who must meet and vanquish the foe. We are slow in realizing that all of us are potential targets for the enemy and that *every industry is in constant danger from enemy saboteurs.*

Our knowledge of modern war is sufficient for us to see that our success depends on industrial production to a greater extent than in any previous war. We are confident of our ability to out-produce any other nation but we may not fully understand that the very importance of production makes our industrial plants the objects of destruction for our enemies.

In a vague sort of way, industrialists grasp the idea that if it comes handy for an enemy to wreck an American steel plant, he will do so, but *they usually don't think it would be handy for some one to wreck THEIR plants.* They know now that our enemies are not waiting for the time when it might be handy but even send saboteurs across the ocean and have actually landed some on our shores, fully equipped with the materials for their mission.

Why aren't our steel plants and all our war industries fully protected against saboteurs? Are they waiting for German bombs with their own names and addresses on them? Are they waiting for an industrial Pearl Harbor? Must some plants be blown up in order to get others to protect themselves?

Some plants have one kind of protec-

The shape of things to come is no secret

THE humming noise you hear is industry at war. When peace comes, that sound need scarcely change its pitch. For in business offices, on assembly lines, in civilian defense centers, and at home, American women are already wishing up new things for industry to make.

They want us to help them keep house, to supply new equipment for it on a scale that makes past performances seem like only practice. Home laundries that "do" everything from tablecloths to negligees. Ranges complete with pressure cookers and unbreakable transparent ovens. Refrigerators with compartments that hold each food, from frozen meats to lettuce, at the ideal temperature and humidity.

Whatever makes housekeeping easier and more economical, women will be waiting for industry to supply. The problem is not what to make, but *how*. Which material, new or old, will contribute the most in beauty, strength, economy, to each part of the new design? How shall it be used, fabricated, finished? Where can it most effectively save weight, cost, time?

For impartial answers to questions about metals industry can turn to Revere. For just as industry in the future will not be restricted to the traditional materials, neither will Revere. In addition to broadening still further the uses for copper and its alloys since the start of the war, Revere has developed facilities for the manufacture of the light metals, and is pioneering in the production of entirely new alloys with important properties that can cut manufacturing costs for many industries.

Today the copper industry is working all-out to win the war. No copper is available for anything else. But post-war planners with specific problems in metals are referred directly to the Revere Executive Offices in New York.

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

Executive Offices: 230 Park Ave., New York

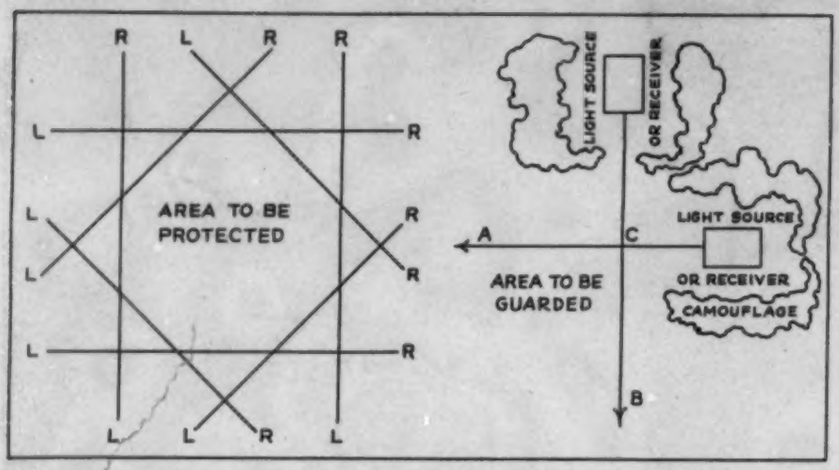


Fig. 3. (Far left)—Arrangement of anti-sabotage units for maximum protection. Each light path may also consist of two beams, one above the other vertically for yet more effective protection. L indicates light sources; R receiver units

Fig. 4. (Immediate left)—Photoelectric "fence" corner is not at point where units are located but at C where the light beams cross; AC being one side and CB being the other side of the "fence" corner

tion and let it go at that; some of the smaller ones have no protection at all. One kind of protection is not enough for defending a country and seldom is it enough for defending an industrial plant.

Many industrialists think that the saboteur is only after bigger plants or those shipping complete war materials. That, too, is a fallacy. A saboteur can accomplish his objective with a lot less trouble by stopping production in a small plant or a raw material plant on which the final assembly plant depends.

The armed forces of our country no longer depend on unaided eyes and ears to detect approaching enemies. They have electrical devices to aid them. In the same way the industrialists can use electrical devices to protect his plant from sagotage. Photoelectric anti-sabotage units provide one of the most effective means of doing this.

A leading manufacturer of such equipment refers to his installations as "invisible or infra-red light. When a person goes through the invisible fence, it gives an audible or visible alarm, or both. It also locates the point of trespass within 500 feet.

In cases where guards are also employed, the invisible fence is sometimes connected to a surprise floodlighting system so that the moment the invisible fence line is crossed that section is flooded with light, putting the trespasser "on the spot" and making him a target for armed guards should he attempt to escape.

The reader, even though he may not be interested in the technical details of the invisible fence will probably want to know something of the principles on which it operates. Two photoelectric units are employed. One is a light source which projects a beam of invisible light in such a way that it can be accurately aimed at the other unit, which is called a receiver. The receiver is a device containing a sensitive photoelectric cell.

As long as the invisible light beam strikes the photoelectric cell, the electric circuit in which the cell is connected continues to pass current. Any interruption of the beam causes the current to stop and thus operates a relay. In turn the relay operates any sight or sound warnings, floodlights, locating signals, etc., to which it is connected.

Exact plans of actual installations cannot be reproduced here for fear of helping the enemy, but some of the general principles will be discussed. Fig. 3 shows a plan which is often used in protecting an area of regular outline, such as a square, rectangle or circle. In Fig. 4 is shown the detail of an invisible fence corner. The units, Fig. 2, are mounted on stancheons made of 1½ inch pipe imbedded in concrete. Weatherproof cases in which the units are housed are provided with screw flanges for mounting on the pipe. Cement bases must be poured deep enough so they will extend below the frost line. If this is not done a frost heave may throw the stancheons out of alignment.

Plan Layouts for Users

Manufacturers of photoelectric anti-sabotage equipment will make layouts for installations when prospective users send in the necessary information. Wherever possible a blueprint of the buildings and grounds should be furnished. Directions should be accurately indicated so that the course of sunlight may be determined. In addition prints should be marked to indicate the location of strong sources of artificial light.

In case the land is rolling or hilly, a profile should be drawn to indicate sharp inclines, declines, humps or knolls. The reason for this is that units are normally spaced 250 to 500 feet apart. Any rise in ground which would project high enough between such spacings would cut off the light beam which is usually about 24 to 30 inches above ground. To overcome that the installation would have to be planned to include extra units, spaced closer together at such locations.

Photoelectric anti-sabotage equipment is also installed inside buildings as protection against sabotage from within.

Many buildings are protected against forced entry by what is known as a closed-circuit system. This consists of an electrical circuit inside the building made of delicate foil strips around all window panes and door panes. Contacts on the window frames and door jams complete the circuit so that when all doors and windows are closed, none can be opened or broken without breaking the electrical circuit and causing an alarm.

Such a system is quite effective within its limitations but since limitations do exist it should be supplemented by photoelectric anti-trespass traps. Closed circuit foil systems can sometimes be evaded by entering an adjacent building and cutting through the wall or by entering through a floor or ceiling.

Saboteurs are not necessarily persons who break into buildings. In many cases they are known to their employers as loyal employes. Such persons do an inside job by concealing themselves within the building. When thus locked within the foil-protected area, they can complete their sabotage unmolested. Although the foil circuit offers obstacles to breaking in, it offers little if any to breaking out. When the saboteur has finished he simply puts a wire across the foil on the door or window from which he wants to escape. Then he can open the door or window without breaking the cuircuit.

From the foregoing it will be seen that the foil system can be "foiled". To prevent this it is best to supplement it with the inside installation of photoelectric trespass traps. These are units similar in construction and operation to the anti-sabotage units except that they have a shorter range and do not require weatherproof cases. Instead of being mounted on stancheons they are supported by wall brackets. For indoor installa-

(*Please turn to Page* 127)

How to Torch-braze Carbide Tips to Shanks and Get Tools on the Job *FAST*

1 After milling and grinding shank angles, mill recess in shank to fit carbide tips. Cut silver solder sheet (.003 thick) slightly larger than recess. Clean tip, sheet and recess with carbon tetrachloride.

2 Place shank in vise as shown. Apply flux liberally to shank recess and well back of recess. Flux silver solder sheet; place in recess. Flux carbide tip; place in recess. Assembly now ready for brazing.

3 Adjust oxy-acetylene torch to 10 lbs. pressure on both gages, with a tip of green flame and blue flame as shown.

4 Apply torch along bottom. Keep moving. Then work around sides and end of shank. Avoid excessive, or spotty, heating.

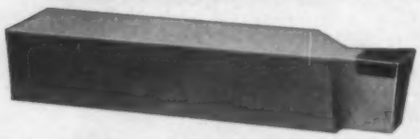
To get carbide tools on the job fast, many plants maintain an active stock of standard Carboloy Cemented Carbide tips—ready for brazing to shanks. In this way, carbide tools can be made available for most jobs within an hour after the need arises. Saves weeks—often months—of time—particularly on non-standard, made-to-order type of carbide tools. For this work you need simply an oxy-acetylene torch, and a few brazing accessories including flux, silver solder sheet or rod, etc. Procedure is simple, fast and efficient. Technique quickly acquired, even by inexperienced personnel. Carboloy Training Film available at $3.50 for fast instruction.

★ ★ ★ ★

Large Standard Tools in Stock for Heavy Work

A range of large size standard tools suitable for heavy cast iron and steel cutting work on boring mills, lathes, etc., are now in stock (1-13-43) available for immediate deliveries. In standard styles Nos. 4 and 7 (right and left hand straight turning) and Nos. 13 and 14 (15° side cutting-edge angle, left and right hand turning). Sizes 1½" square and 1½" x 2". Grade 44A for cast iron; 78B for steel.

Standard-Design Carboloy Tools for Cutting Off to Hollow Cores



Following an analysis of thousands of cut-off tools ordered in the past, standardized designs have been established for tools of this type. These cut-off tools are easy to order, speed up deliveries and eliminate special drawings. Standard-design Carboloy cut-off tools are designed for cutting off to hollow cores, such as on shell forgings, etc. Write for catalog GT-142.

CARBOLOY COMPANY, INC.

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5 When solder melts and shank and tip become dull cherry red, direct flame on the tip. Don't allow solder to become so "watery" that it all runs out from under the tip.

6 Then take a holding rod and move tip back and forth to wipe in joint and distribute silver solder evenly. Make certain that the solder works up around the two enclosed sides of the tip.

7 Now remove flame and press down squarely on tip. Heavy pressure not needed. Hold until silver solder sets.

8 Set tool aside and allow to cool naturally. *Do not quench* in liquids as tip may crack.

CARBOLOY TRADEMARK *CEMENTED CARBIDES* TRADEMARK

TOOLS • DIES • DRESSERS • CORE BITS • MASONRY DRILLS • WEAR RESISTANT PARTS

Fig. 1—Tool ready to weld with shank notched out and edges beveled

Fig. 2—Same tool welded and hardened, ready for finish grinding

Fig. 3—Common planer tools, also reclaimed

Fig. 4—Tools for vertical boring mills, same stage as Fig. 2

By CARL B. ERICSON
Welding Department
Sullivan Machinery Co.
Claremont, N. H.

HIGH-SPEED STEEL

Tipped Tools

. . . . made quickly and cheaply by welding salvaged parts

SALVAGING discarded ends of high-speed steel tool bits, worn-out high-speed steel blades removed from inserted tooth milling cutters and many other types of high-speed steel tools that are worn to the limit in various types of clamp holders is now not only a matter of economy but all-important as a means of saving critical alloys and assuring maximum service from those you are able to obtain.

The management of the average shop finds that it is up against a real problem to supply tools for increased production when using new and unskilled help. In many cases tools are broken a lot faster than they can be replaced.

Years back, the gray-haired tool dresser of long experience could be depended upon to get the shop out of a jam by producing a tool forged from a discard dug out of a pile of junk or fished out of some drawer of a little used machine. Too few of these men are on the job now, and the shop which still has one is fortunate indeed.

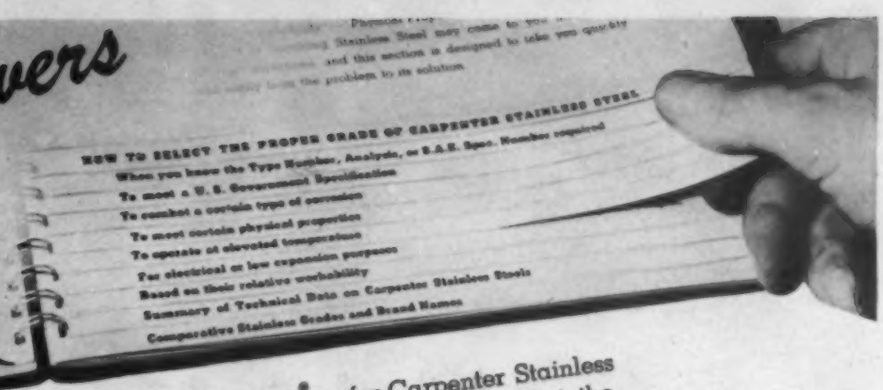
Many electric and acetylene welders who have tried to salvage broken parts of high-speed steel have given it up due to inconsistent results.

A salvage method developed in our welding department and in use for many months has so far proved satisfactory. High-speed steel tools of the most common types have been produced ready to grind in a few minutes.

In Fig. 1, a tool is ready to weld, the shank having been notched out and edges beveled. Fig. 2 shows the same tool

Quick answers

to your questions about Stainless Steels...


HOW TO SELECT THE PROPER GRADE OF CARPENTER STAINLESS STEEL
When you know the Type Number, Analysis, or S.A.E. Spec. Number required
To meet a U. S. Government Specification
To combat a certain type of corrosion
To meet certain physical properties
To operate at elevated temperatures
For electrical or low expansion purposes
Based on their relative workability
Summary of Technical Data on Carpenter Stainless Steels
Comparative Stainless Grades and Brand Names

Carpenter's 98-page book, "Working Data for Carpenter Stainless Steels", contains answers to many of your questions about the selection and fabrication of Stainless Steels. To get a better idea of all the useful information between its covers, read the sample questions and answers on this page.

1 Q. Which grade of Stainless Steel will best meet our physical requirements?

A. The "Selection Section" (shown above) contains a 2-page table to help you determine which Stainless will best meet your needs.

2 Q. Which Stainless type could we use to combat a certain type of corrosion?

A. Pages 16 and 17 of this Working Data Book list over 200 corrosive substances, and the relative degree of corrosion resistance to each provided by various Stainless Steels.

3 Q. How about Army-Navy Aeronautical, Navy, Federal and AMS Specifications?

A. Turn to pages 13-15 for information on Grades, Classes, Types and Compositions to meet individual specifications.

4 Q. Does the Carpenter Working Data Book contain information about various fabricating operations?

A. Yes . . . 23 pages of useful data on Forging, Annealing, Pickling, Machining, Blanking, Punching, Shearing and Welding . . . to mention only a few.

Other subjects covered in this handy Data Book . . .

- *Heat Resisting Steels for High Temperature Service*
- *Alloys for Electrical and Low Expansion Purposes*
- *Relative Workability of Carpenter Stainless Steels*
- *Useful Tables, Glossary of Terms, etc.*

Use the Carpenter Working Data Book to help you get more production, fewer rejects, from every pound of Stainless Steel. Use it to help you plan the development of your post-war products. A note on your company letterhead is all that is needed to start this book on its way, anywhere in the U. S. A.

The Carpenter Steel Co., 139 Bern St., Reading, Pa.

Carpenter STAINLESS STEELS

BRANCHES AT Chicago, Cleveland, Detroit, Hartford, St. Louis, Indianapolis, New York, Philadelphia

Fig. 5—Top, hook planer tool; center, tool made from a bit; bottom, tool made from a worn out tooth of an inserted-type milling cutter

Fig. 6—Tools for turret lathes, same stage as Fig. 2

welded and hardened, ready for finish grinding.

In Fig. 6 tools are used largely on turret lathes, are shown at the same stage as is in Fig. 2.

The tools in Fig. 4 are used on vertical boring mills, and are in the same stage of production. Note that the shanks have seen previous use.

Fig. 3 shows the common planer tools, also at the same stage. The diamond point in the center had a lot of metal left, but the tail locating it in its original holder had become broken.

Fig. 5, top, presents a hook planer tool used on T-slots that could not be milled due to projections interfering with cutter. The tip is made from a discarded flatted round, inserted tooth from a well known milling cutter. Little preparation for welding was required. The shank was hammer drawn and bent, the notch gas cut. The radius let the weld tuck under to the center on both sides without beveling. When this tool wore down from use and grinding to a point where the distance from the nose to the shank would interfere with planing to dimensions, the tip was removed by gas cutting, needed metal on shank was replaced by welding with low-alloy high-test rod, a slight grinding operation was performed, and a new tip welded in place. Many of these tools are in everyday operation.

Fig. 5, center, shows tool made from a bit previously used with a clamp-type holder and which had been used to the limit. The lower item in Fig. 5 is a tool made from a worn out tooth of an inserted-type milling cutter.

As will be noticed from the unretouched photographs, utility and not beauty is the thing.

Welding Is Simple: The welding method used is not at all complicated. Shanks are SAE-1045 or equivalent. Annealed or hardened tips are used. The tip is placed in position on the shank and clamped if needed. Using the electric arc, a spot is tack welded so that shank and tip can be handled as a unit. An acetylene torch, using an excess acetylene flame, is then applied to the top and sides of the tip—first at a distance to warm slowly, then more rapidly until finally a forging heat is reached on the tip (1400 to 1700 degrees Fahr.). If the heat has been correctly applied, the shank is 300 to 400 degrees Fahr. cooler than the tip.

The welding is then quickly performed using a medium-coated low-carbon electrode. The current setting is lower than usually specified for the size of electrode but may be affected by generator or transformer characteristics. In general, low amperage is used.

Without allowing the portions of the tools which have been welded to cool down, they are placed in a hardening furnace or a forge fire, or heated with the acetylene torch with a slightly, excess acetylene flame. Heating is continued until a temperature of 2300 degrees Fahr. is reached. Then hardening is effected by an air blast or oil quench. *This avoidance of cooling and reheating appears to have a very substantial effect in minimizing subsequent breakage.*

Hardened tools may be drawn, if desired, but we have noted little difference between drawn tools or tools used as hardened, whether in an air blast or by quenching in oil.

Of course this method is varied slightly in line with the equipment on hand. Analysis of shanks and properties desired influences treatment and should be considered. Parts may be preheated separately in two furnaces if desired.

Stainless or heat-resisting welding electrodes improve the appearance and strength of the welding. However, the cheaper rod has proved satisfactory for most work. Our experience has showed that tools made by this method take more punishment and stay sharp longer than those made wholly from high-speed steel.

ASA Approves 1942 Code For Pressure Piping

Approval of the 1942 revision of the American standard, "Code for Pressure Piping" (B31.1) was announced recently by American Standards Association, 29 West Thirty-ninth street, New York.

Covering power piping, gas and air piping, oil piping, district heating piping, refrigeration piping, fabrication details, materials and identification, the code was first approved and appeared in first edition form in 1935.

FOR NEW MACHINES OR CHANGE-OVER TO...

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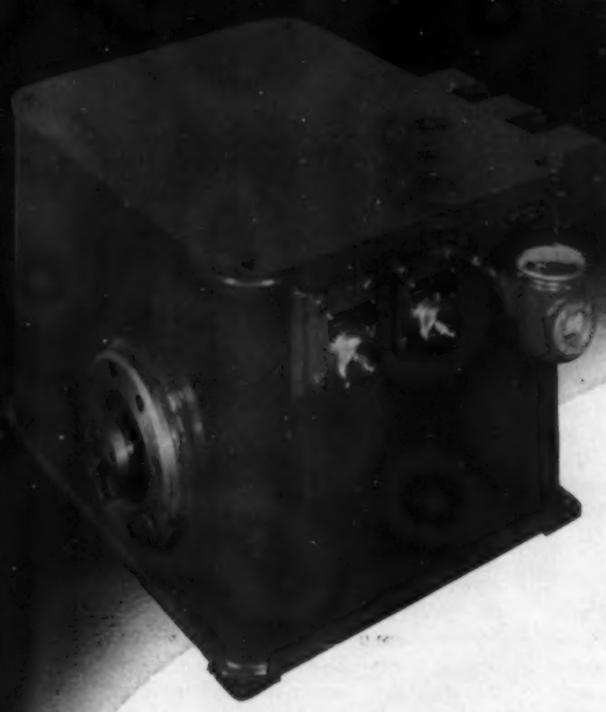

The power unit illustrated controls six cylinders on a special contour milling machine—four of which are rapid traverse feed and return . . . two are for clamping. The unit provides a complete automatic machine cycle controlled by push buttons and limit switches, which in turn actuate solenoid operated valves. Feed rates are infinitely adjustable throughout the range of the feed control valves.

There are "HY-MAC" Hydraulic Power Units that may be applied to grinding, milling, boring, drilling, piercing, riveting, pressing, etc. . . . it is merely necessary to establish the functions of the machine that are to be hydraulically operated—and our engineers will recommend a Power Unit and a layout of the circuits to best do the job . . . Hydraulics are completely adaptable to any motion desired—for feed and traverse of multiple or single tools . . . for indexing and locating . . . for clamping, etc., all or any of the movements and in any combination. . . . Any designer or builder of machines can adapt their specific design, either partially or completely to "HY-MAC" HYDRAULICS . . . . . .

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HYDRAULIC MACHINERY

Electrical Developments in the Steel Industry

By F. MOHLER
Engineer
General Electric Co.
Schenectady, N. Y.

FIRST blooming mill equipped with amplidyne control was placed in service early in 1942. In addition to reducing the number of control devices by 50 per cent, the amplidyne system permits the use of relays carrying fractions of an ampere instead of contactors carrying hundreds of amperes.

Acceleration and deceleration of the mill are controlled accurately, thus making it possible to obtain the maximum rates at all times. Improved production has resulted from effective load limit control which permits the motor to put out its maximum at all times with full protection, and from improved voltage maintenance which allows a higher average speed. Sixteen reversing drives are being equipped with this amplidyne system of control.

In addition to several reversing or 3-high plate mills, the electric equipment for the largest semicontinuous plate mill is now being built. This mill consists of a 1250-horsepower scale breaker, a 4000-horsepower broadside mill, a 7000-horsepower reversing rougher, a 500-horsepower scale breaker, and four 5000-horsepower finishing stands. New control systems for voltage and power factor, using the amplidyne exciter, are being employed.

The motor for the reversing rougher mentioned above is of particular interest. It is rated 7000-horsepower, 25/60 revolutions per minute and, although it is the largest motor that has ever been built, both from a physical and torque standpoint, it has no through shaft, thus representing a radical departure in the design of rolling mill motors. It is 44 feet long, 16 feet high, and 18 feet wide, and weighs 1,000,000 pounds.

Many hot-strip mills have been changed over for the rolling plate, necessitating the addition of tables, transfers, cooling beds, levelers, and plate shears. In order to obtain the desired speed range and the required rates of acceleration and deceleration for the proper handling of the plate, the alternating-current runout tables for one wide hot-strip mill were replaced by adjustable-speed, mill-type, direct-current runout tables employing newly developed amplidyne control.

Tests recently have been run on a 5-stand tandem cold-strip mill in connection with obtaining the best gage possible at all conditions of operation. The world's fastest cold-strip mill was designed with many novel features and has already been operated at its maximum speed of 3850 feet per minute.

By actual test it has been found that it is possible to get on-gage at threading speed and maintaining this gage all the way up to running speed, during running speed, and during deceleration to threading speed again.

A novel 3-stand tandem mill went into service for rolling strip up to 16 inches wide at a speed at excess of 2000 feet per minute.

A new twin-temper-pass mill went into operation with entry and delivery tension reels, entry and delivery tension rolls, and a delivery speed in excess of 3000 feet per minute. Amplidyne control is employed throughout. Many new features have been incorporated in this drive, including a special speed control for maintaining relative speeds between the two main drive motors. This speed control is of the electronic amplidyne type. (Described in STEEL, March 30, 1942, page 78).

Employs Individual Drives

Electric equipment for three rod mills is being built at present. These mills are of the continuous type with individual motors for driving the various stands. Particular attention has been given to the design of the motors to reduce to the minimum the impact-speed drop and "ballooning" or overshooting in speed on recovery.

A novel tube mill is being built which will require 16 direct-current adjustable-speed driving motors. The mills are only on 12½-inch centers. Here, too, special attention has been given to the design of the motors driving the individual stands of these mills so as to reduce to the minimum the impact speed drop and "ballooning" caused by speed recovery.

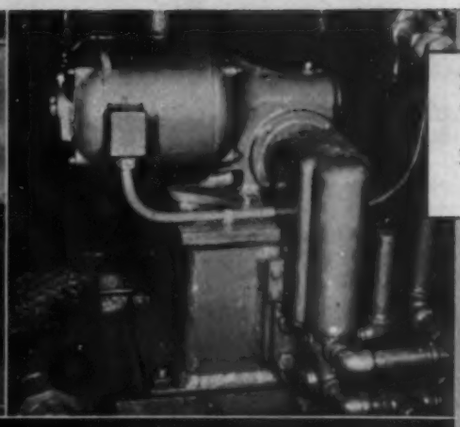
A new slip regulator equipment was developed for use with the flywheel motor-generator sets serving reversing mills. Previously, this application required a large series transformer which supplied current to an alternating-current torque motor for operation of the electrodes, a direct-current auxiliary hoist motor, and a fair amount of control. The new scheme requires only an ordinary current transformer whose output is rectified and applied to the field of an amplidyne exciter, which in turn controls a generator supplying power to a mill motor, Type MD, for operation of the electrodes. This motor has a lower inertia and a greater torque which gives faster operation of the electrode than does the alternating-current torque motor. The auxiliary hoist motor and its control are no longer needed.

Two twin drives are being built for slabbing mills. These drives employ not only the general system of amplidyne control, but also a new system of amplidyne load and speed balance between the drives.

In a twin drive, the lower motor is set close to the mill and at about floor elevation, while the upper motor is set back of and above the lower motor. This means that the upper motor must have a jack shaft passing over the magnet frame of the lower motor. The drive end bearing for the jack shaft connecting to the upper motor, therefore, must be placed on a bridge straddling the drive end bearing for the lower motor. In order to keep to the minimum the length and the angularity of these spindles connecting to the mill, it is desirable to have as short a distance as possible between the drive shafts of the upper and lower motors. One problem that came up in connection with the design of these drives was to design a new bearing requiring much less space than former steel mill bearings so that the bearing for the lower motor could be removed without disturbing that of the upper motor. This bearing is designed with a much shorter height, eliminates the use of oil rings, and depends upon flood lubrication.

Last year was without peer in the building of arc furnaces for the production of special steels and other metals. A radically new system of control was developed wherein an amplidyne generator is used to supply power directly to each electrode motor. Because of its high sensitivity and rapid response, this control provides more accurate, faster, and smoother operation of the electrodes.

(*Please turn to Page* 128)



Extreme Left—Century 7½ horsepower, vertical mounted, direct current, drip proof water pump motor.
Left — Century ½ horsepower motor driving a Diesel oil pump.

CENTURY MOTORS and GENERATORS

For the Toughest Sea-Going Service Meet the Rigid War Requirements of Naval and Merchant Marine Applications

7½ horsepower, direct current, ball bearing, fabricated steel, water proof Navy motor.

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Century shipboard motors and generators are built to stand up under

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They meet Navy Specifications 17M10 and 17M17, A.I.E.E., recommended practice on shipboard No. 45, and the Maritime Rules of Shipping.

Century Motors' famous ability to "keep a-running" is daily being demonstrated and thoroughly proven on the high seas in applications such as those mentioned above.

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Refrigeration compressor motors
Steering gear motors
Fan and blower motors
Oil burner motors
Generators and motor generating sets for light, power, and communication
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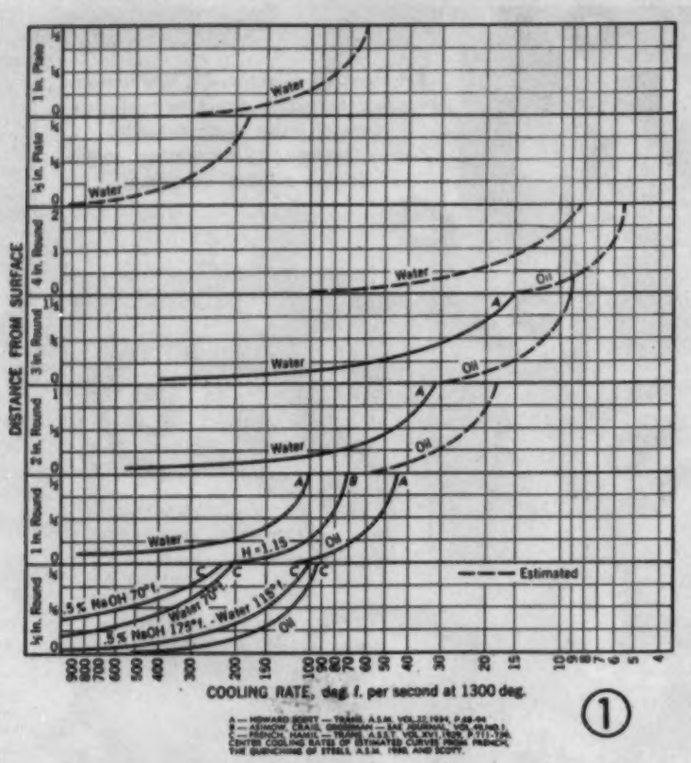
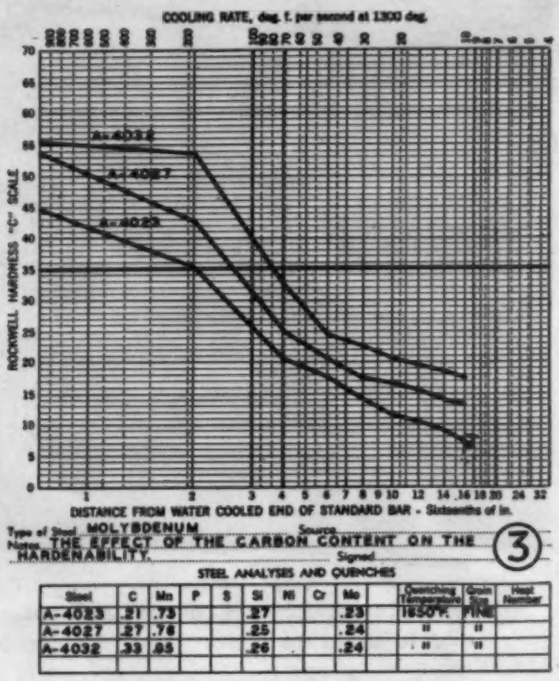
308

One of the Largest Exclusive Motor and Generator Manufacturers in the World.

User Report No. 9 on

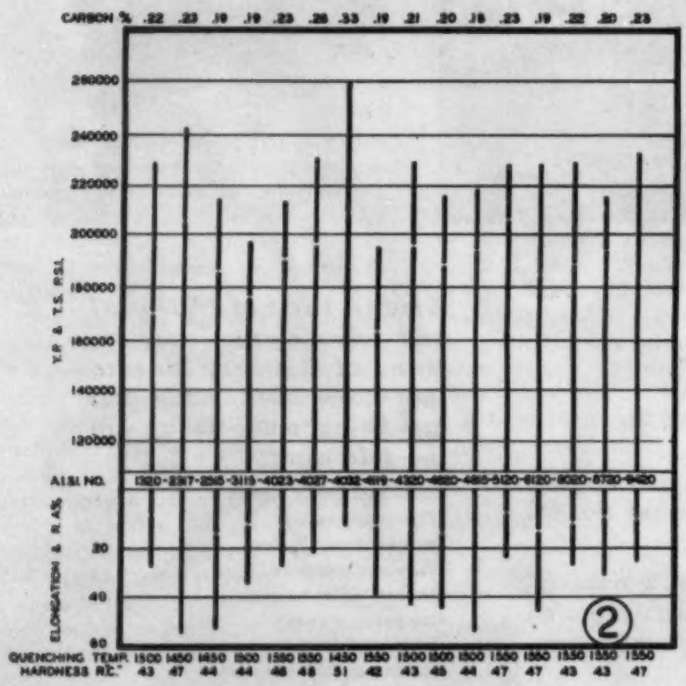
NE (National Emergency)


DISTANCE FROM SURFACE
1 In. Plate
½ In. Plate
4 In. Round
3 In. Round
2 In. Round
1 In. Round
½ In. Round
Water
Oil
H = 1.15
5% NaOH 70°f.
5% NaOH 175°f.
Water 70°f.
Water 115°f.
Estimated
COOLING RATE, deg. f. per second at 1300 deg.
A — HOWARD SCOTT — TRANS. A.S.M. VOL. 22 1934, P. 68-94
B — ASIMOW, CRAIG, GUDEMAN — SAE JOURNAL, VOL. 40 NO. 1
C — FRENCH, HARIS — TRANS. A.S.S.T. VOL. XVII NOV. P. 711-734
CENTER COOLING RATES OF ESTIMATED CURVES FROM FRENCH,
THE QUENCHING OF STEELS A.S.M. 1940 AND SCOTT.
①


COOLING RATE, deg. f. per second at 1300 deg.
ROCKWELL HARDNESS "C" SCALE
A=4032
A=4027
A=4023
DISTANCE FROM WATER COOLED END OF STANDARD BAR - Sixteenths of In.
Type of Steel MOLYBDENUM Source
Notes THE EFFECT OF THE CARBON CONTENT ON THE HARDENABILITY. Signed
③

STEEL ANALYSES AND QUENCHES

Steel	C	Mn	P	S	Si	Ni	Cr	Mo		Quenching Temperature	Grain Size	Heat Number
A-4023	.21	.73			.27			.23		1650°f.	FINE	
A-4027	.27	.76			.25			.24		"	"	
A-4032	.33	.85			.26			.24		"	"	



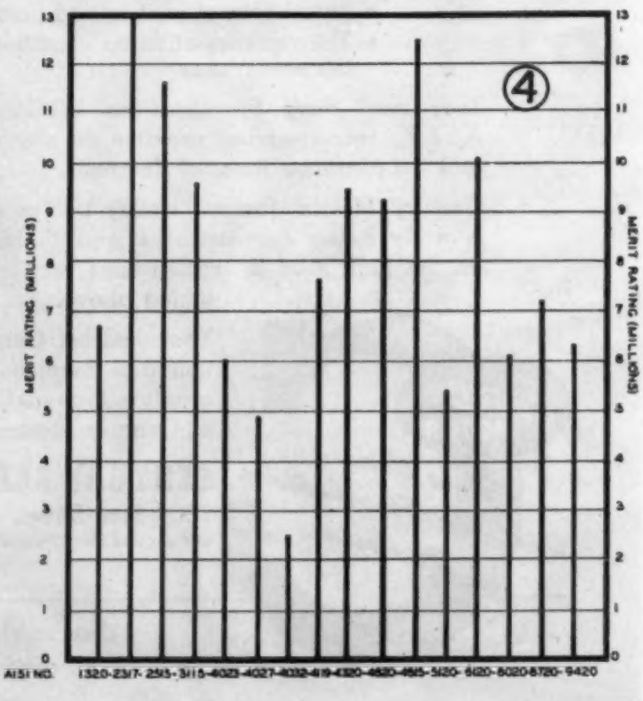


Fig. 1 — Hardenability chart showing cooling rates between center and surface of various materials

Fig. 2 — Comparison of tensile properties. Test bars were standard 0.5-inch ASTM, quenched in water at temperatures from 1450 to 1550 degrees Fahr. as noted

Fig. 3 — Hardenability tests showing how carbon content changes hardenability without regard to alloy content

Fig. 4 — Quality rating of various steels according to Tiemann's merit formula

Fig. 5 — Tensile properties of various steels. The 0.5-inch ASTM test bars were quenched in water from 1650 degrees

Fig. 6 — Tensile properties of AISI NE-9420 steel

Experience with . . .

By A. S. JAMESON
Works Metallurgist
West Pullman Works
International Harvester Co.
Chicago

ALLOY STEELS

—TYPE NE-9420

THE PURPOSE of the creation of the NE (National Emergency) alloy steels is now a matter of history. For those who wish to follow their development in detail and to become familiar with their properties, see STEEL, Feb. 9, 1942, p. 70; March 16, p. 72; June 8, p. 66; June 15, p. 66; July 13, p. 80; July 20, p. 86; Aug. 3, p. 70; Aug. 17, p. 40; Aug. 31, p. 41; Sept. 7, p. 78; Oct. 19, p. 66; Nov. 9, p. 96; Dec. 28, p. 27.

For latest revised list of NE steels, see STEEL, Jan. 25, p. 84.

For reports from users of NE steels, see issues of Nov. 16, p. 106; Nov. 23, p. 90; Nov. 30, p. 62; Dec. 7, p. 112; Dec. 14, p. 99; Dec. 21, p. 70; Jan. 11, 1943, p. 60. The Dec. 7 and the Dec. 21 articles detailed International Harvester experience with carburizing steels in the NE-8000 series and a study of NE-8339, 8442, 8739, respectively. This third article is devoted to the NE-9400, 9600 series, with details of work done with the carburizing grade NE-9420.

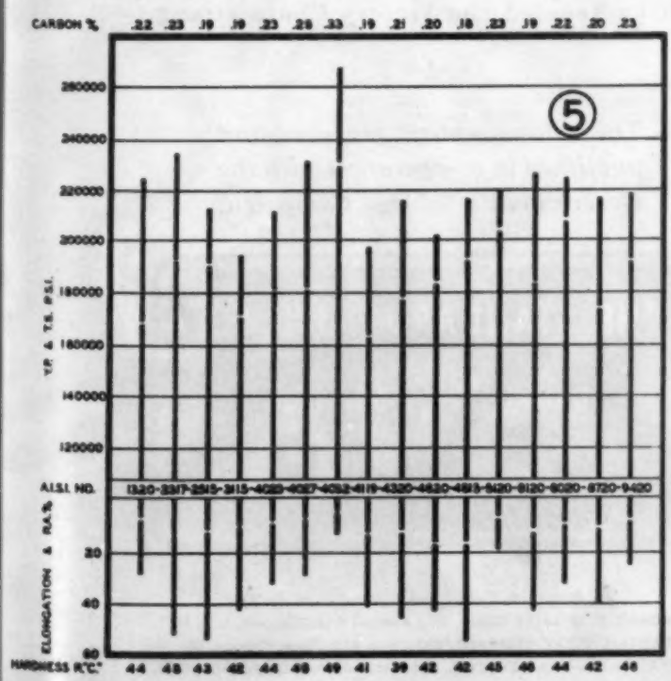
The data given in this article are derived from one source and are comparable inasmuch as they were obtained under the same heat-treating conditions.

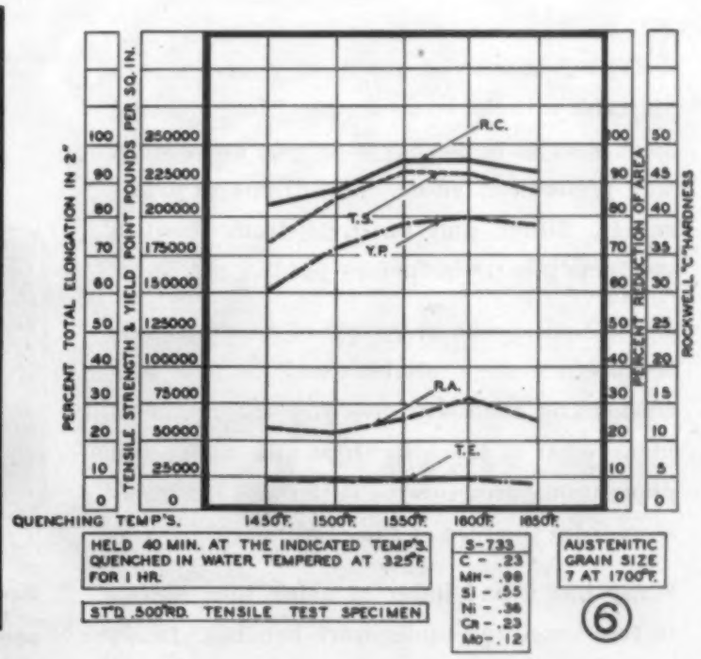
It should be understood that considerable variation in physical characteristics is to be found within the chemical ranges of each alloy composition so that wherever the chemical composition is deemed significant it is shown in the text. The standard alloy compositions are also included as a basis of comparison, and special reference is made to the latest NE steel composition, the 9400 series. The NE steels are all made to an ASTM 5 to 8-grain size after carburizing at 1700 degrees Fahr. for 8 hours and slowly cooling. The standard alloy compositions were also fine-grained steels.

Carburizing Grade NE-9420: The chemical composition ranges of the NE

TABLE I—Chemical Composition of NE Carburizing Steels

AISI Steel Symbol	Alloy Class	Element in Per Cent— —Carbon— Min.	Max.	Manganese Min.	Max.	Sulphur Max.	Phosphorus Max.	—Silicon— Min.	Max.	—Nickel— Min.	Max.	—Chromium— Min.	Max.	Molybdenum Min.	Max.
NE-8020	Manganese-	.18	.23	1.00	1.30	.04	.04	.20	.35	...	...	...	...	.10	.20
NE-8022	Molybdenum	.20	.25	1.00	1.30	.04	.04	.20	.35	...	...	...	...	.10	.20
NE-8618		.13	.17	.70	.90	.04	.04	.20	.35	.40	.60	.40	.60	.15	.25
NE-8615		.13	.18	.70	.90	.04	.04	.20	.35	.40	.60	.40	.60	.15	.25
NE-8617	Nickel-	.15	.20	.70	.90	.04	.04	.20	.35	.40	.60	.40	.60	.15	.25
NE-8620	Chromium-	.18	.23	.70	.90	.04	.04	.20	.35	.40	.60	.40	.60	.15	.25
NE-8715	Molybdenum	.13	.18	.70	.90	.04	.04	.20	.35	.40	.60	.40	.60	.20	.30
NE-8720		.18	.23	.70	.90	.04	.04	.20	.35	.40	.60	.40	.60	.20	.30
NE-8620		.20	.25	.70	.90	.04	.04	.20	.35	.40	.60	.40	.60	.20	.30
NE-9415	Manganese-Silicon-	.13	.18	.80	1.10	.04	.04	.40	.60	.20	.40	.20	.40	.08	.15
NE-9420	Chromium-	.18	.23	.80	1.10	.04	.04	.40	.60	.20	.40	.20	.40	.08	.15
NE-9422	Nickel-Molybdenum	.20	.25	.80	1.10	.04	.04	.40	.60	.20	.40	.40	.40	.08	.15





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carburizing steels are shown in Table I. The value of carburizing steels lies in their ability to be easily fabricated into parts and their ability to be heat treated to produce hard wear-resisting surfaces. The alloy carburizing grades in the uncarburized condition are also capable of being heat treated to produce tensile strengths around 200,000 pounds per square inch in small sections. In this condition they form the cores of carburized parts. The properties of the carburizing grades are therefore of interest in both the carburized and uncarburized condition.

Properties in the Uncarburized Condition; Tensile Tests: The tensile properties were obtained by quenching standard 0.525-inch test bars in water from 1450 to 1650 degrees Fahr. at 50-degree Fahr. intervals and tempering at 325 degrees Fahr. The bars were ground to 0.500-inch diameter for tensile testing. Hardness readings were taken on the ½-inch section.

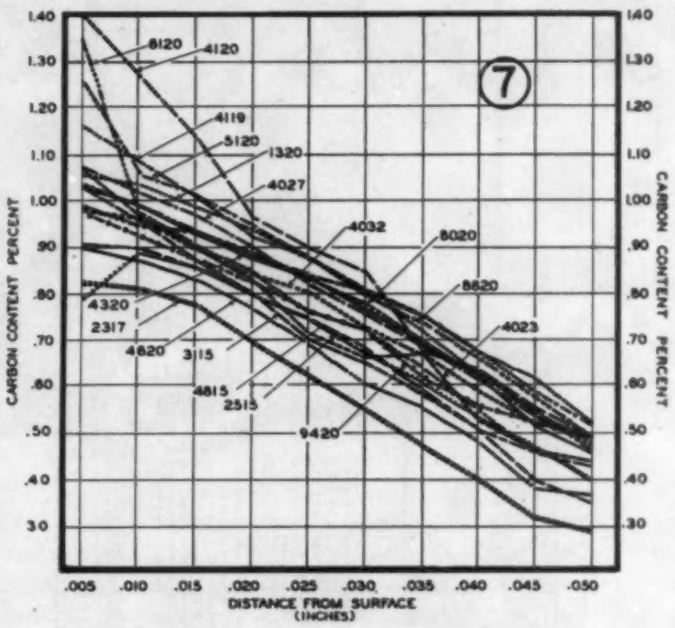
The quenching temperature which gave the best physical properties was selected as representing the steel composition.

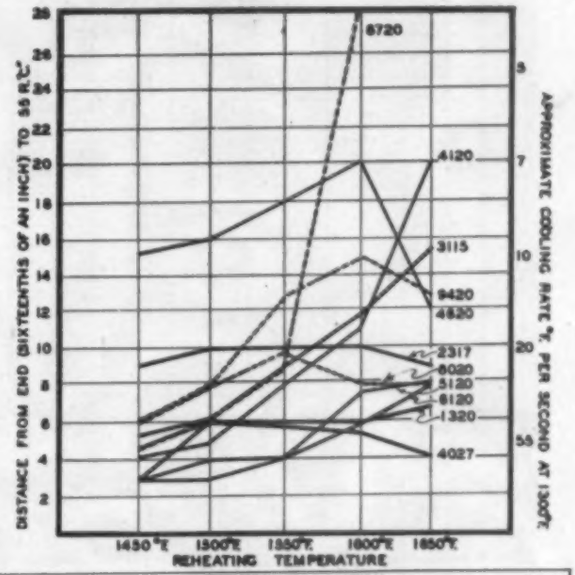
The properties obtained from NE-9420 are given for the full quenching range in Fig. 5. The temperatures from 1450 to 1550 degrees Fahr. are within the temperature ranges used in the hardening of carburized parts. It will be noted that a quenching temperature of 1550 degrees Fahr. gives the best all-

TABLE II—Hardenability in Terms of Bar Size

AISI Steel Symbol	Hardenability: Approximate Cooling Rate °Fahr. per Second at 1300° Fahr.	Maximum Bar Size (Inches) to Which Tensile Properties Would Apply: Water	Oil
A-1320	100	1	½
A-2317	65	1 7/16	11/16
A-2515	45	1⅝	1
A-3115	70	1⅜	¾
A-4023	190	7/16	3/16
A-4027	150	⅝	¼
A-4032	80	1 1/16	11/16
A-4119	65	1 7/16	11/16
A-4125	60	1½	⅞
A-4320	40	1 11/16	1 1/16
E-4620	70	1⅜	¾
A-4815	20	2⅛	1⅛
A-5120	100	1	½
A-6120	80	1 1/16	11/16
NE-8020	100	1	½
NE-8720	55	1 1/16	11/16
NE-9420	90	1¼	⅝

Fig. 7 — Carburizing properties, carbon concentration and gradient, carburized 8 hours at 1700 degrees Fahr.





A.I.S.I. NO	CHEMICAL COMPOSITION: MANGANESE	SILICON	CHROMIUM	NICKEL	MOLYBDENUM	VANADIUM
A-1320	1.98	.20				
A-2317	.55	.24		3.79		
A-3115	.54	.24	.89	1.19		
A-4027	.78	.29	.11	.11	.23	
A-4120	.73	.27	.83		.21	
E-4620	.50	.31	.21	1.72	.24	
A-5120	.83	.23	.74			
A-6120	.84	.30	.78			.18
NE-8020	1.10	.25			.18	
NE-8720	.81	.30	.46	.56	.23	
NE-9420	.98	.55	.23	.36	.12	

8

Fig. 8—The effect of the reheating temperature on the hardenability rating. Specimens carburized at 1700 degrees Fahr. and quenched in oil, then reheated to the indicated temperature and quenched in water

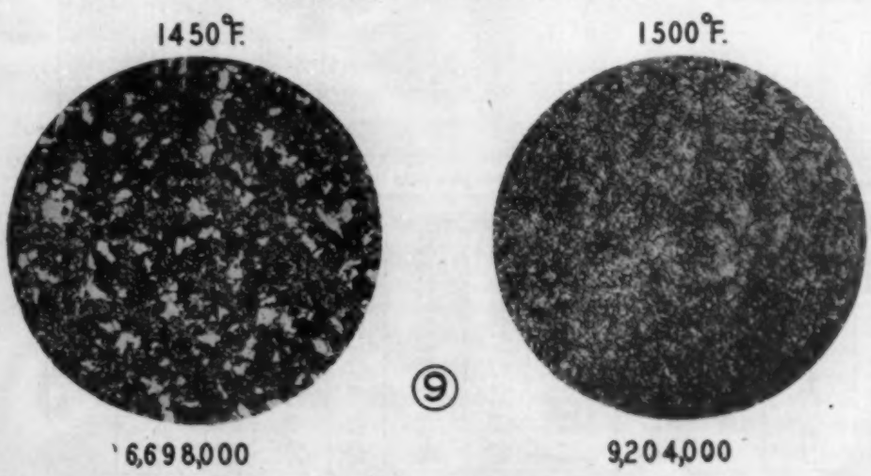


Fig. 9 — These microphotographs show how quenching temperature affects grain structure and merit rating. Both are 4620 steel, etched in nital and shown at 100 diameters

around properties for NE-9420 steel.

The tensile properties are also given after quenching from 1650 degrees Fahr. (see Fig. 5), which would represent the properties obtained by direct quenching parts from the carburizing heat. However, it is noted that the properties are not altogether comparable with those obtained by heating for 8 hours at 1700 degrees Fahr. and quenching, known as pseudo carburizing, for the long holding time has the effect of showing up heat characteristics as well as composition characteristics.

The maximum tensile properties obtained from the heat treatment of the 0.525-inch sections, for the NE steels as well as several standard alloy compositions, are shown in Fig. 2. It will be noted that NE-8020, NE-8620 and NE-9420 have tensile properties comparable with the standard alloy compositions. The NE-8620 steel contained 0.23 per cent molybdenum and would therefore represent the high side of NE-8620 and the low side of NE-8720.

In order to interpret these data properly, it is to be understood that the highest tensile strength does not necessarily represent the most desirable steel, for the elongation and reduction-of-area values which represent the toughness factor are also important. High tensile strength can be obtained by increasing the carbon content of the analysis, but the elongation and reduction of area values are reduced proportionally. This is illustrated in the instance of AISI A-4023, A-4027 and A-4032, which have the same alloy composition but different carbon contents. It will be noted also that the surface hardness varies with the carbon content.

It might be of interest to mention a formula which has been used to denote quality which takes into consideration the points touched on in the previ-

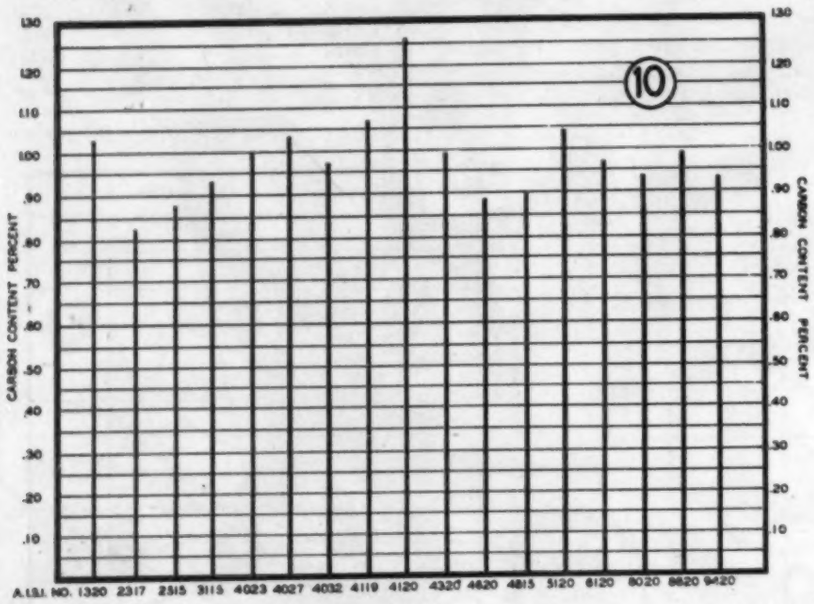
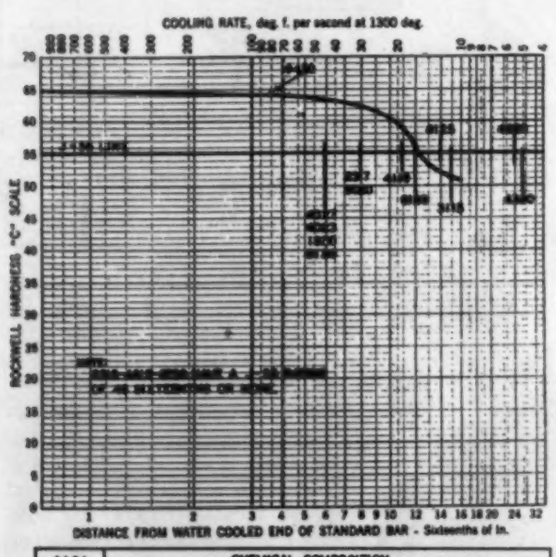


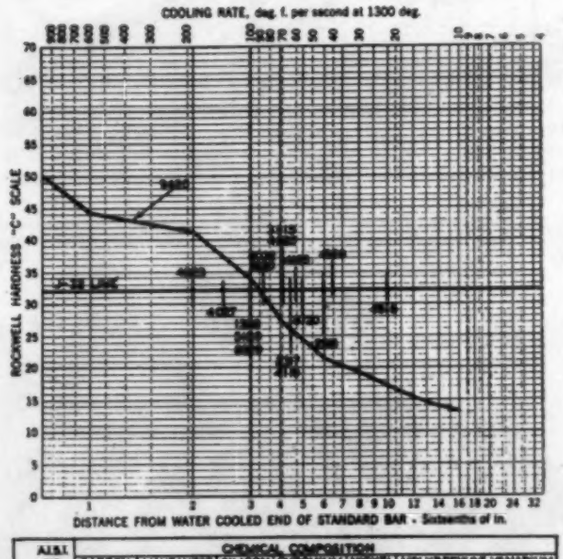
Fig. 10 — Carburizing properties, carbon 0.01-inch below surface

Fig. 11—Relative hardenability of various steels, analyses shown. Carburized at 1700 degrees Fahr. for 8 hours and direct quenched in water

Fig. 12 — Comparative hardenability. End-quench tests, heated to 1650 degrees Fahr. and quenched in water


COOLING RATE, deg. f. per second at 1300 deg.
ROCKWELL HARDNESS "C" SCALE
DISTANCE FROM WATER COOLED END OF STANDARD BAR - Sixteenths of in.
11

A.I.S.I. NO.	CHEMICAL COMPOSITION					
	MANGANESE	SILICON	CHROMIUM	NICKEL	MOLYBDENUM	VANADIUM
A-1320	1.85	.24				
A-2317	.60	.23		3.34		
A-2515	.47	.29		5.04		
A-3115	.69	.24	.83	1.24		
A-4023	.79	.28			.25	
A-4027	.77	.28	.08		.24	
A-4119	.81	.25	.55	.10	.23	
A-4125	.90	.28	.54		.21	
A-4320	.53	.30	.47	1.77		
E-4620	.55	.27	.12	1.78	.22	
A-4815	.58	.27	.15	3.40	.24	
A-5120	.77	.30	.86			
A-6120	.84	.30	.78			.16
NE-8020	1.15	.28	.08		.25	
NE-8720	.81	.30	.46	.58	.23	
NE-9420	.98	.55	.23	.36	.12	


COOLING RATE, deg. f. per second at 1300 deg.
ROCKWELL HARDNESS "C" SCALE
DISTANCE FROM WATER COOLED END OF STANDARD BAR - Sixteenths of in.
12

A.I.S.I. NO.	CHEMICAL COMPOSITION						
	CARBON	MANGANESE	SILICON	CHROMIUM	NICKEL	MOLYBDENUM	VANADIUM
A-1320	.23	1.55	.24				
A-2317	.16	.56	.23		3.37		
A-2515	.17	.48	.19		5.10		
A-3115	.17	.53	.24	.87	1.34		
A-4023	.21	.73	.27			.23	
A-4027	.27	.78	.29			.24	
A-4032	.33	.85	.26			.24	
A-4119	.21	.82	.27	.54		.22	
A-4125	.24	.89	.26	.54		.22	
A-4320	.22	.60	.25	.55	1.82	.22	
E-4620	.16	.53	.27	.16	1.68	.20	
A-4815	.16	.56	.25	.29	3.38	.24	
A-5120	.23	.79	.16	.74			
A-6120	.19	.84	.30	.78			.18
NE-8020	.23	1.17	.25			.17	
NE-8720	.20	.81	.30	.46	.58	.23	
NE-9420	.23	.98	.55	.23	.36	.12	

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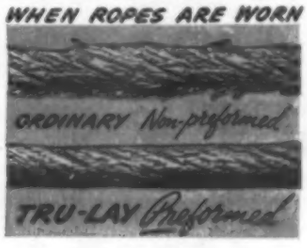

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ous paragraph. The formula (taken from Tiemann) is Q = S x D where Q represents quality, S the yield point or tensile strength in any unit and D the elongation or reduction-of-area value, preferably the reduction of area.

This formula can, of course, only be used in a general way. It can, however, be employed to determine whether or not a steel has been heat treated to produce the maximum obtainable properties. To illustrate, this formula when applied to some 4620 steel data gave a value of 6,698,000 for the 1450-degree Fahr. quench and 9,204,000 for the 1500-degree Fahr. quench. A microstructural examination of the test bars showed the presence of free undissolved ferrite (see Fig. 9) which could readily account for the lower quality value for the 1450-degree Fahr. quench.

Applying the formula to the tensile values in Fig. 6, we obtain values as shown in Fig. 4. This chart gives the highest quality ratings to the AISI A-2317, A-2515 and A-4815, the steels containing the highest percentage of nickel. NE-8020, 8620 and 9420 are about the same and compare with 3120, 4023, 4119 and 5120.

Fig. 5 shows the tensile properties obtained by quenching from 1650 degrees Fahr.

Hardenability Tests: The tensile properties given in Figs. 2 or 5 can only be said to apply to ½-inch sections unless hardenability data are available which can be used to calculate in what other sizes the tensile data would apply. It is in this field, the field of hardenability, that the alloying elements show their greatest effect.

Fig. 12 gives the hardenability curve for NE-9420 and shows the position of the other compositions in relation to

(*Please turn to Page* 134)

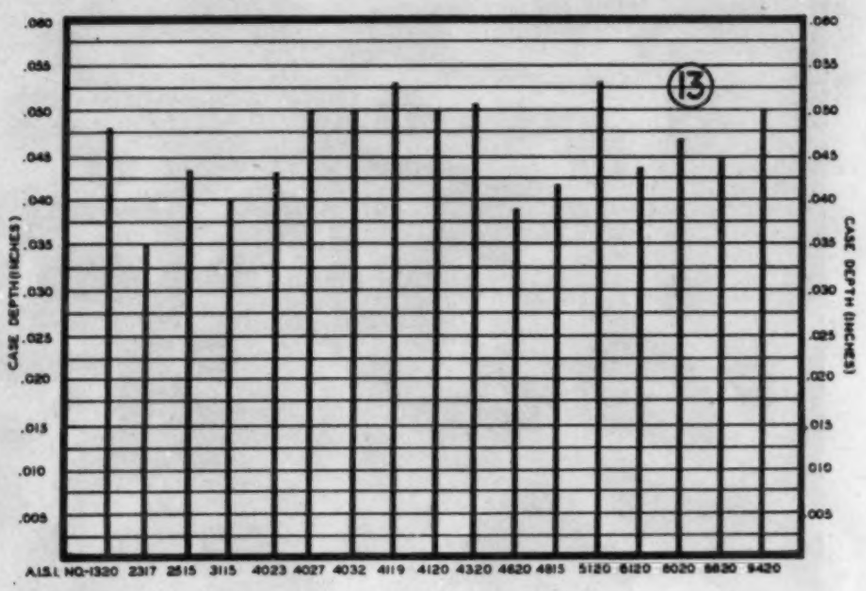


Fig. 13 — Case depth to reach 0.5 per cent carbon, 1-inch cylinders, 8 hours, 1700 degrees

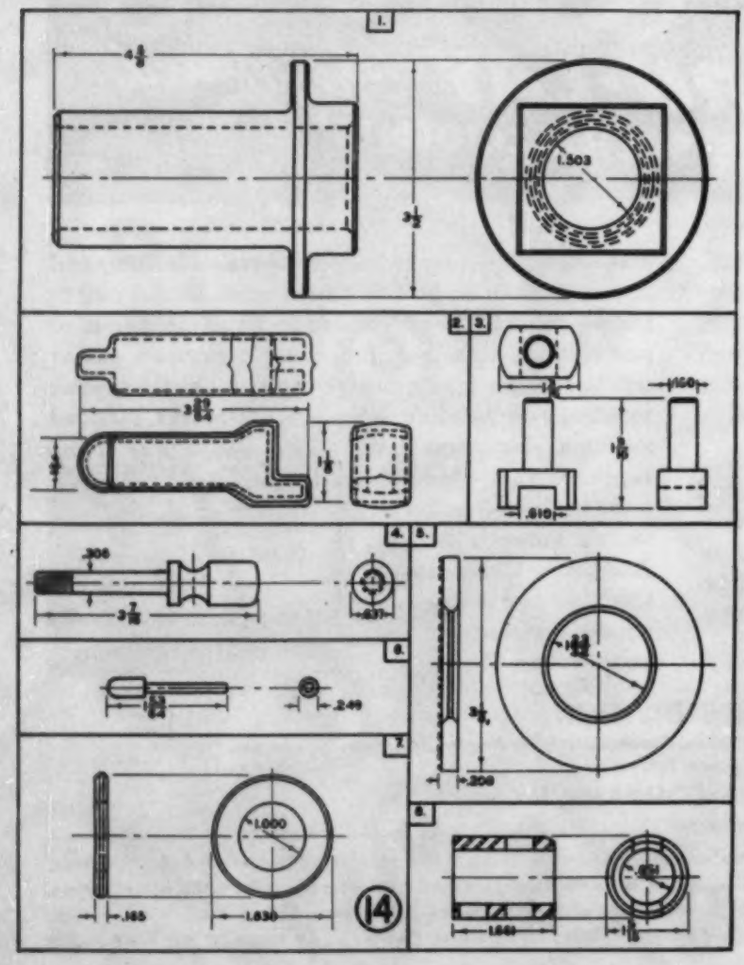
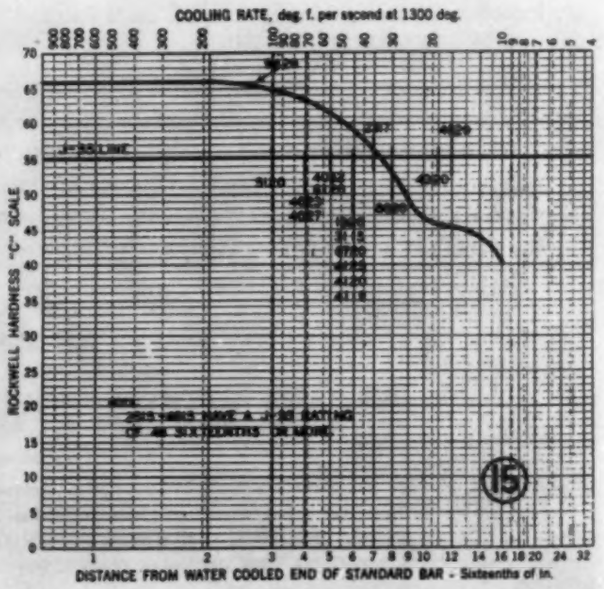


Fig. 14.—A few parts now being made from AISI NE-9420 steel at International Harvester. For data on these parts, see details in Table III

Fig. 15—Hardenability comparison, same steels as in Fig. 11 but carburized at 1700 degrees Fahr. for 8 hours and quenched in oil, then reheated to 1480 degrees Fahr. and quenched in water


COOLING RATE, deg. F. per second at 1300 deg.
ROCKWELL HARDNESS "C" SCALE
DISTANCE FROM WATER COOLED END OF STANDARD BAR - Sixteenths of in.
15

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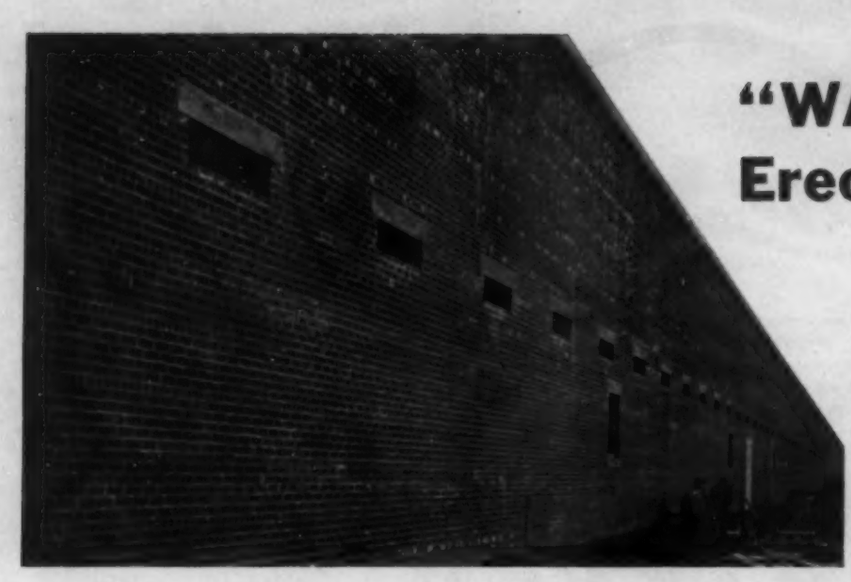

"WARSPEED" Erection Shortcut

. . . sets dizzy pace in construction of huge new aircraft engine plant

ASSIGNED one of the heaviest loads in the entire aircraft engine industry, Wright Aeronautical Corp., Paterson, N. J., has extended its production to a vast, newly constructed plant called a "warspeed" factory of concrete "somewhere in New Jersey." The new plant will produce engines in the upper horsepower brackets to power combat planes, troop transports and cargo carriers of the United Nations.

Four months and two weeks after excavation began on the factory site, an entire department for fabricating crankcases had been moved into the plant and hundreds of men and women machine tool operators were at work.

The new factory is a one-story concrete structure spread over acre after acre. *It was constructed by a new "warspeed"* method, a wartime process which is far *faster than steel or lumber construction and which saves on each two million feet of floor space enough steel for a naval cruiser, as well as saving labor and building costs. In fact, the building was completed before steel for a normal type of factory building could have been placed on the site.*

Key to the speed of construction, believed to be a record for a plant of such large size, was the use of traveling wooden forms for pouring the concrete. Foundation footings for the building were poured soon after excavation got under way during the last week in May. Then the plant was built from the roof down, using a new type of traveling form for the concrete.

Instead of a custom-built form, the "warspeed" method employs mobile platforms supported by wooden trestles on rollers. See Fig. 2. These platforms were 20 feet wide, the width between columns, and 114 feet long. The roof was fabricated by pouring concrete on top of the platform, the concrete also flowing over into wooden forms which shaped the upright columns. A few days of drying served to harden the "high early-strength" concrete.

Then the platform was rolled forward to slide from underneath the dry concrete, leaving a slab of roof 20 feet wide

(*Please turn to Page* 129)

Fig. 1 (*Above*) — *Due to speed of erection, plant was completed in an exceptionally short time, and so was enabled to start production of aircraft engines long before the time it would have been possible had conventional construction methods been employed. View here shows end wall of vast new plant*

Fig. 2 (*Below*) — *Here one of the mobile wooden platforms is being pulled up into place to allow pouring concrete to make a new set of supporting columns and ceiling area, all formed integral. After drying for a few days, forms are pulled forward, leaving a section of roof supported on its columns*

The Rolls With the Red Wabblers

"Techni" Process Rolls for four-high
hot and cold mills
give greater production
at lower cost;
they're made of enriched pure alloy steel,
especially heat treated
to produce required hardness of body surface,
well-tempered, tough to resist spalling,
journals are soft and strong.
Since 1803—Pioneers, Engineers & Builders.
Mackintosh-Hemphill Company,
Pittsburgh & Midland, Pennsylvania.

strong to withstand stresses

Other Mackintosh-Hemphill Products:
Rolling Machinery . . . Shape Straighteners
Strip Coilers . . . Shears . . .
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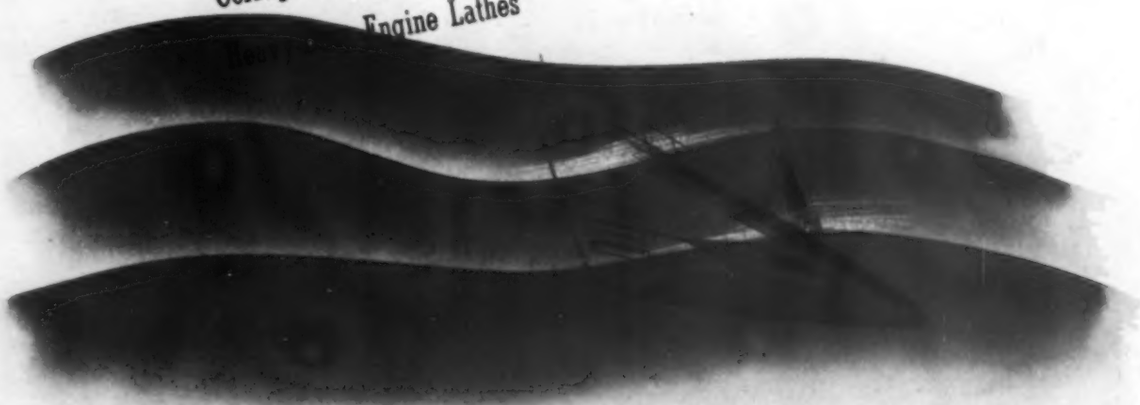
Iron-Steel Castings . . .
The NEW Abramsen Straightener . . .
Improved Johnston Patented
Corrugated Cinder Pots and Supports . . .
Engine Lathes

"Techni"

Process

Back-up Rolls



LIBERTY SHIPS are re-enlisting rugged veterans of other wars—triple expansion steam engines. Simple in design, their parts are built in many plants.

But casting the cylinders is not simple. That part of the job was given to Cooper-Bessemer—with its 109 years' experience in casting engine cylinders. These huge parts—weighing 7½ to 10 tons—are turned out at emergency tempo.

Production is streamlined. Already Cooper-Bessemer has cast cylinders for 350 Liberty ships—and has freely shared its methods with other foundries.

Finding a way to do a job faster and better was what led Charles Cooper to pour his first machinery castings in 1833. That same purpose guides modern Cooper-Bessemer in building diesels and compressors for war, at four times normal rate—will help build better engines for you after Victory.

BUILDERS OF DEPENDABLE ENGINES FOR 109 YEARS

THE Cooper-Bessemer CORPORATION

Mount Vernon, O. • Grove City, Pa.

RADIO TUBES

. . . . for heat treating by high-frequency induction

By H. C. HUMPHREY
Research Division
Westinghouse Electric & Mfg. Co.
Baltimore, Md.

IN SOME heat-treating applications, it is desired to approach unlimited speed of heating of a continuous conducting mass. Such uniform and continuous high-speed heating is difficult to obtain with fuel-fired or conventional types of furnaces. There must be a temperature gradient from the heated chamber into the interior of the mass heated. To cause heat to flow into the interior of this mass at the desired speed this temperature gradient becomes impossibly steep. This inherent limitation of conventional heating methods is avoided through the use of the electrical induction heating.

Probably the largest single application thus far for industrial electronic equipment is in steel mills for flowing or brightening of electrolytic tinplate. Eleven steel companies are now constructing 26 new electrolytic tinplating lines, and one steel mill alone is in process of installing a total of 3700 kilowatts of 200,000-cycle power. It is proposed ultimately to operate some of these continuous tin flow lines at speeds as high as 1000 feet per minute and higher. For such application each electrolytic tin brightening line is provided 1200 kilowatts of 200-kilocycle power capacity. *Such equipment also has important possibilities for continuous heat treatment of wire and strip.*

Theoretical considerations, confirmed experimentally, show that induction heating of metals is greatly influenced by the frequency of the electric current. For many applications, particularly thin sheet or shapes of small cross-sectional area, frequencies as high as hundreds of thousands of cycles rather than a few thousand cycles give the best results. Heat produced in the strip is a function of the time rate of change of magnetic flux linking the strip and the inductor coil. Considering the speed of the strip, which may be 600 to 1000 feet per minute, it is evident energy must be transferred from the electric circuit to the strip at an extremely rapid rate. To obtain the required time rate of change of flux, it becomes necessary to increase rate of variation (i.e., frequency) considerably beyond conventional power frequencies. For tin flowing, 200 kilocycles (200,000 cycles per second) appears appropriate.

Transfer of energy from the electric circuit to the tinplate is accomplished by passing the sheet through a multi-turn inductor heater coil, essentially rectangular in cross section, Fig 2. Electric current flowing in the inductor coil sets up a strong alternating magnetic field, which links with the tinplate passing through the inductor coil. As is the case of any conductor cut by a moving (i.e., alternating) magnetic field, a voltage is induced in the strip as though the strip were a one-turn closed circuit, causing a current to flow in the tinplate, heating it. High-frequency generators of the conventional rotating type are available for frequencies up to somewhat over 10,000 cycles. As is the case for radio transmission, frequencies of the order of hundreds of kilocycles and over are best generated by vacuum-tube oscillators. Availability of these electronic-type high-frequency generators offering adequate power capacity for individual industrial use at frequencies of 100,000 cycles and upward is a very recent development.

The 1200 kilowatts of 200-killocycle power for 1000-feet-per-minute tin-fusing lines is obtained from 12 high-power vacuum tubes of the WL 895 water-cooled type, each tube delivering 100-kilowatt output, Fig. 3. This same tube using air instead of water cooling has been used in broadcast transmitters for some time. Electric power from the service bus, alternating current at commercial frequency, is converted to high-voltage direct current using WL 857B mercury rectifier tubes in full wave 3-phase rectifiers as shown in Fig. 4. These supply the plate voltage for the oscillator tubes.

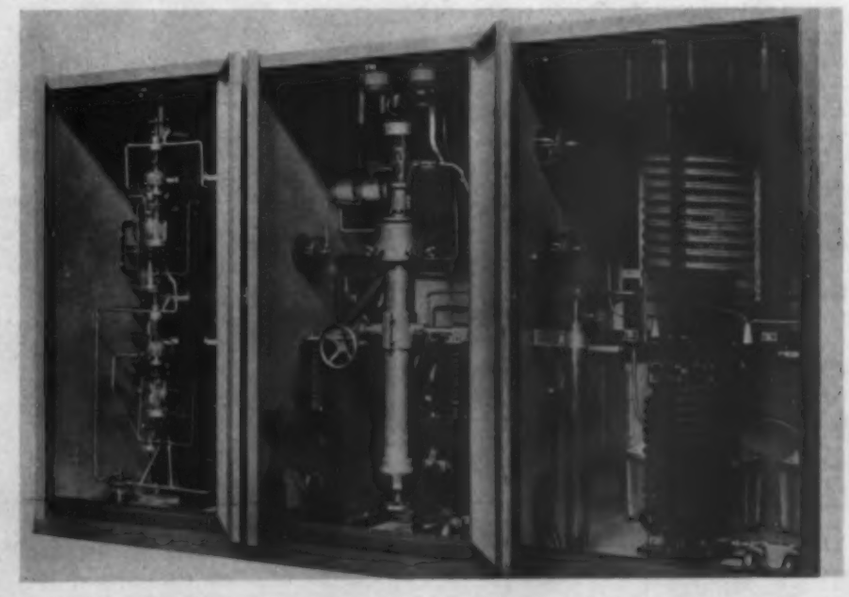
The oscillators are self-excited, using a tuned plate circuit. Each oscillator unit comprises two tubes connected in a push-pull circuit. The 200-kilowatt output from each push-pull oscillator unit is connected through transmission lines to heater coils at the tin-brightening line where the high-frequency power is applied to the tin strip by each heater coil successively as the tin plate passes through it, until the strip is brought to the fusing temperature of 450 degrees Fahr. just as it leaves the last heating coil.

A complete high-frequency induction heating system, Fig. 1, for tin brightening comprises:

—Switchgear and protective circuit breaker.

—Saturable core reactor, induction

Fig. 1 — Key equipment of the 1200-kilowatt system consists of 12 cabinets, each holding equipment with an output of 100 kilowatts as shown here. Of the three cubicles in the cabinet, the left contains the high-voltage rectifiers, the center the 100-kilowatt oscillator tubes, the right the oscillator tank circuits



regulator, or other means for adjustment and regulation of oscillator power output.

—Rectifiers and oscillators.

—Distilled-water cooling system and heat exchanger.

—Control and metering equipment.

—Automatic regulator to match heating produced by the oscillator to speed of the reflow line.

—Transmission lines between oscillators and inductor coils.

—Inductor heater coils to transfer the electrical energy from the oscillator into the tin strip where it is converted into heat.

The main circuit breaker is used to energize and denergize the rectifier oscillator plate circuit. Power demands in steel mills being of substantial proportions this plate circuit breaker must provide short-circuit protection of the order 250,000 to 500,000 amperes at voltages of 6600 and above. Where operating practice is such that the breaker is likely to be opened and closed repeatedly, an air circuit breaker has advantages over an oil type.

Although the tinplate ordinarily passes through the inductor heater coils at a constant speed, it is necessary with some operating practices to slow down the flow line to 20 per cent or less of normal speed while welding the beginning of a new length of strip to the end of the preceeding strip. An induction regulator, saturable core reactor, or other method of adjusting the direct-current voltage on the plates or the oscillator tubes, in combination with some form of control whose input stimulus is proportional to speed or temperature of the tin strip, furnishes means for automatic regulation of power output of the oscillator.

Where an induction regulator, rather than a saturable reactor is used for adjustment of power output, it cannot be of the conventional automatic line-voltage regulator type with 10 or 20 per cent buck and boost, but instead must provide for 100 per cent regulation and be motor operated with remote control. Since changes in line speed take place within a matter of seconds rather than minutes, the induction regulator must be capable of going from 100 per cent buck to 100 per cent boost in the minimum possible elapsed time.

The required kilowatt output rating of the oscillators is based on the well known formula for determining quantity of heat which must be added to M pounds of a substance of given specific heat to increase its temperature the desired number of degrees.

$KW = 7.62\ \gamma\ C\ b\ t\ N\ \Delta\ T \times 10^{-3}$.

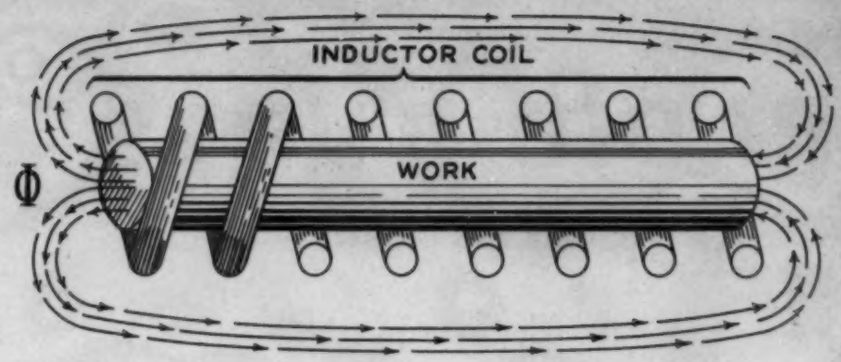
KW = Kilowatts

γ = density of strip grams/cm^3

C = specify heat

b = width of strip inches

t = thickness of strip inches



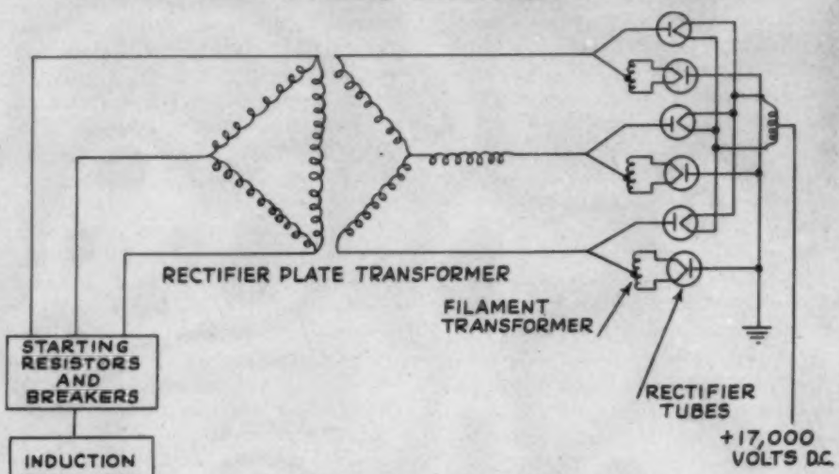


Fig. 2 (Top) — Electric current flowing in the inductor heating coil at a frequency of 22 kilocycles (200,000 cycles per second) sets up a strong alternating magnetic field. Resulting hysteresis losses and eddy currents in the work heats it up rapidly

Fig. 3 (Directly above) — Mercury vapor rectifier tubes in a full-wave 3-phase system provide 17,000 volts of direct current for the power oscillator tubes from the plant power system (6600 volts, 60 cycles, 3 phase)

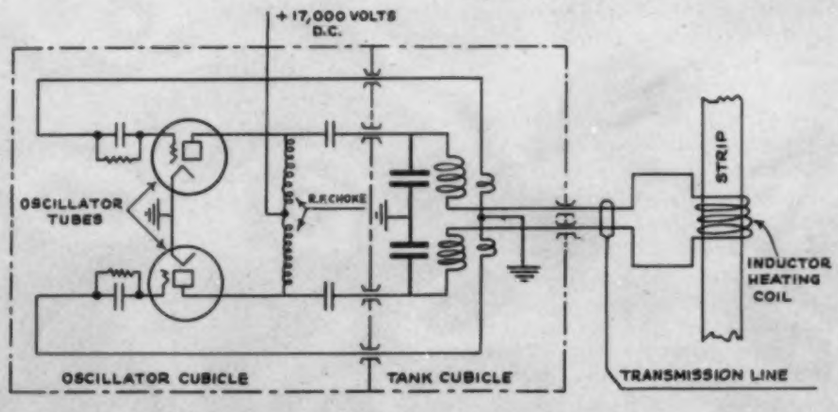


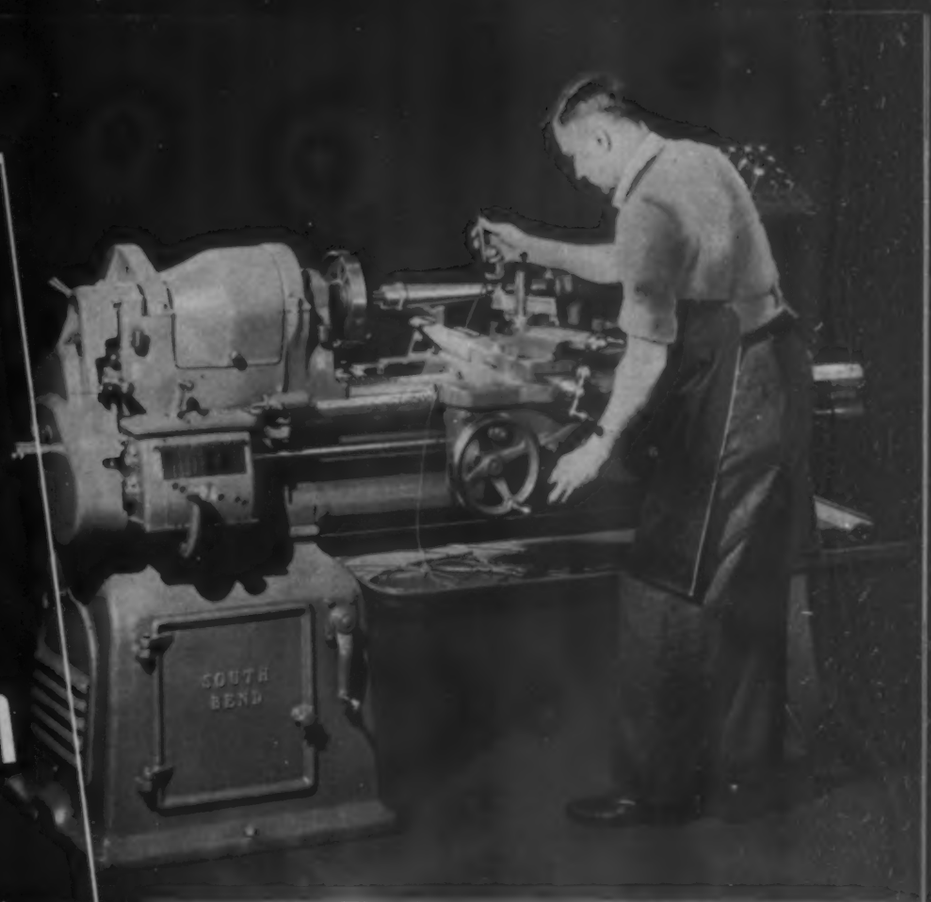
Fig. 4—Simplified schematic diagram of 100-kilowatt high-frequency oscillator as used for continuous heating of strip at speeds up to 1000 feet per minute

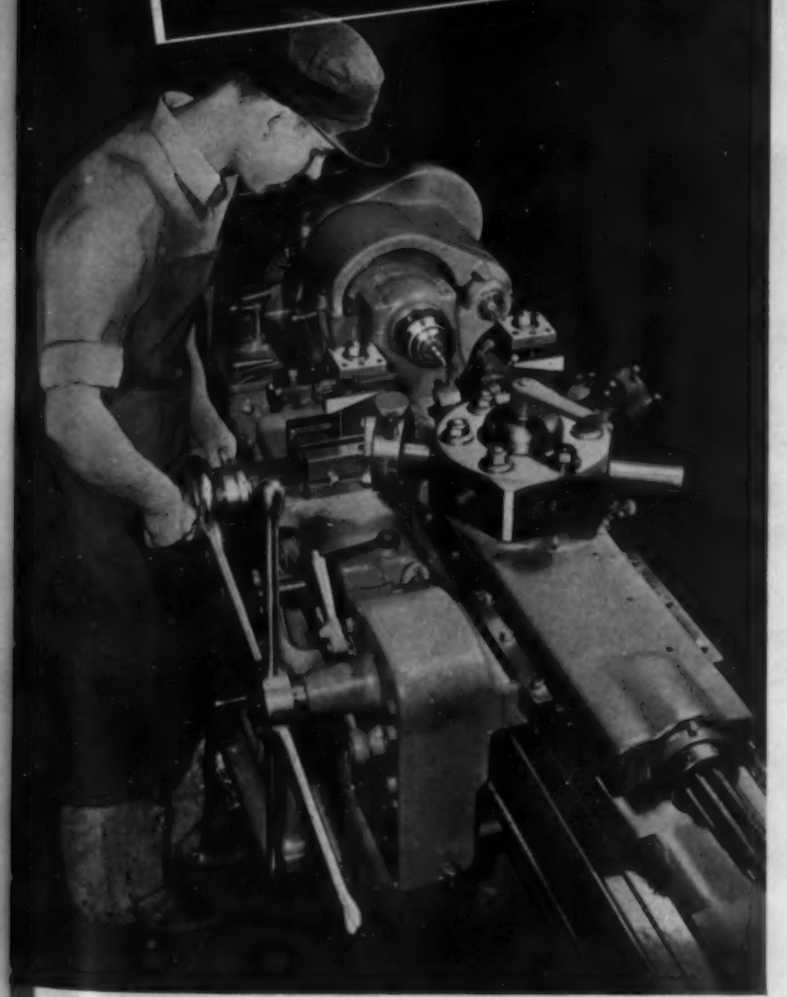
N = speed of strip feet/min.

ΔT = change in temperature degrees Fahr.

For maximum tube life, distilled cooling water is used to carry away the heat dissipated at the plates of the oscillator tubes. To minimize maintenance, distilled water is also used to cool the conductor coils. Cooling of the heating coils reduces their I^2R losses as well as maintains the coils at a safe operating temperature. The distilled water is cooled either by means of a radiator and blower-type water cooler or by means of a heat exchanger for transferring heat to raw tap water which can be allowed to run to waste. Piping of the distilled water system is noncorrosive as must be all parts of the heat exchanger coming in contact with the distilled water.

Matched for Production





SOUTH BEND Turret Lathes matched with South Bend Engine Lathes make a team that is hard to beat for the production of precision parts.

Take advantage of the time-saving features of South Bend Turret Lathes for work that is adaptable to multiple tooling and simultaneous cuts. Use South Bend Engine Lathes for second operations, turning between centers, and for the difficult jobs that require engine lathe versatility. And select South Bend Toolroom Lathes for your precision toolroom work.

There is a practical size and type of lathe for every class of work. South Bend Engine Lathes and Toolroom Lathes are made in five sizes: 9″, 10″, 13″, 14½″ and 16″ swings. South Bend Turret Lathes are made in three sizes: No. 2-H, Series 900, and Series 1000. Write for a copy of our new Catalog No. 100B in which the entire line of South Bend Lathes is illustrated and described.

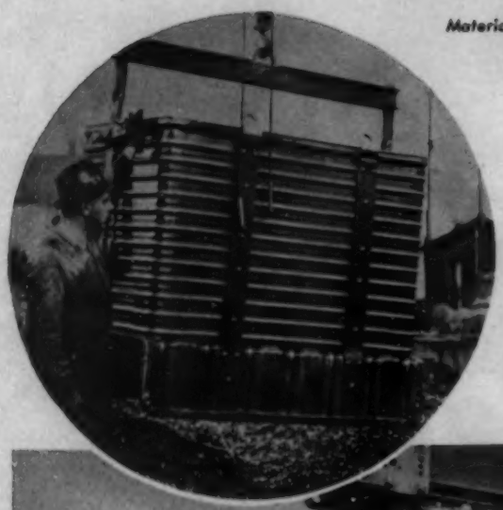
SOUTH BEND LATHE WORKS

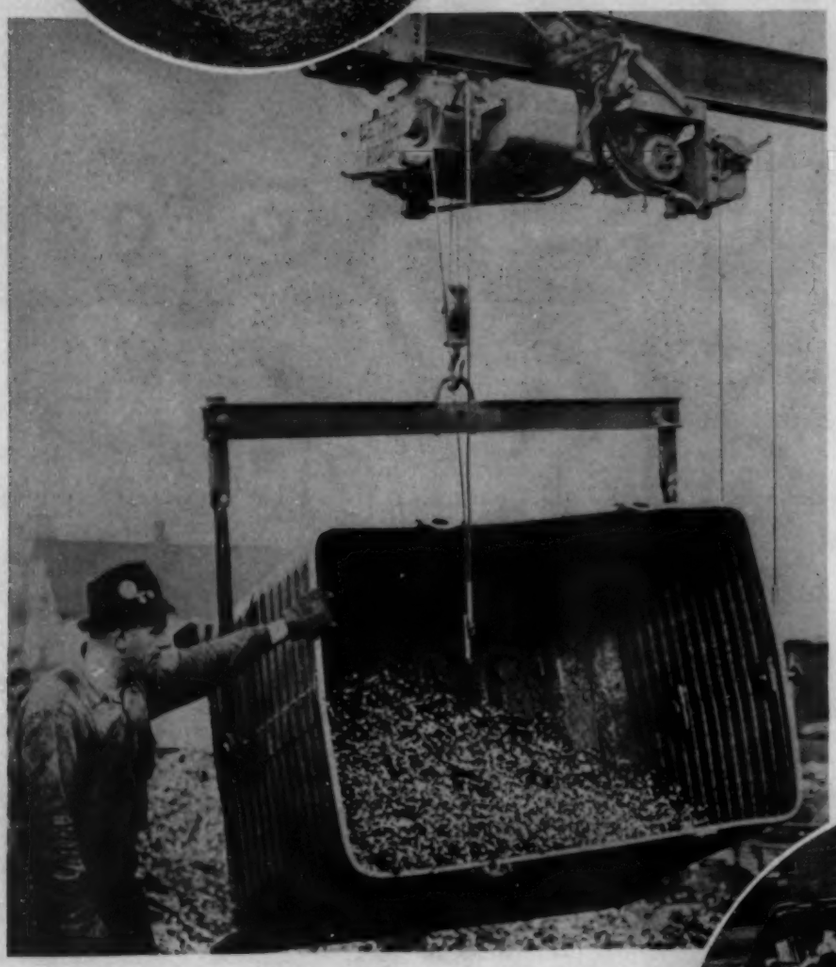
South Bend, Indiana — *Lathe Builders For 36 Years*

By WEST SHEA
Materials Handling Equipment Section
Union Metal Mfg. Co.
Canton, O.

skid, pallet handling system

Typical applications show extreme versatility





(Concluded from Last Week)

AN IMPROVED materials handling system has been developed by Union Metal Mfg. Co., Canton, O. It utilizes an exceptionally sturdy design of skids, pallets and box sections as described in the Dec. 25, 1942, issue of STEEL. Some of the important economics made possible by such a system are described here.

A chain manufacturer was handling his product in 20-year-old barrels that were equipped with small trunions for handling with hoists located at various stations through the shop. The spotting of these barrels through production was accomplished with a two-wheel hand truck. Small lots of chain were handled exclusively by hand lift trucks. To a materials handling engineer the confusion and resultant loss of time were really appalling. Aisles were almost always jammed with materials in various stages of production.

This situation was greatly improved through the installation of telescopic-type tiering fork trucks in conjunction with tiering-type all-steel skid boxes. Such

Fig. 7. (Top view)—Skid box equipped with suspension yoke for handling chips from machines to scrap-loading areas by means of monorail system. Operator is about to trip latch which will let box tip to discharge contents

Fig. 8. (Directly above)—Here latch of box in Fig. 7 has been tripped and most of contents dumped out. Operator is steadying box for the photographer. In actual operation, he lets it swing free

Fig. 9. (Right)—This type of skid box has pockets to receive the forks of the fork truck which then can dump it safely by revolving its forks as shown here

ATTACK

IS THE BEST DEFENSE!

HERE'S HOW TO ATTACK YOUR BATTERY MAINTENANCE PROBLEMS

1. Keep adding approved water at regular intervals. Most local water is safe. Ask us if yours is safe.
2. Keep the top of the battery and battery container clean and dry at all times. This will assure maximum protection of the inner parts.
3. Keep the battery fully charged—but avoid excessive over-charge. A storage battery will last longer when charged at its proper voltage.
4. Record water additions, voltage, and gravity readings. Don't trust your memory. Write down a complete record of your battery's life history. Compare readings.

If you wish more detailed information, or have a special battery problem, don't hesitate to write to Exide. We want you to get the long-life built into every Exide Battery. Ask for booklet Form 1982.

Our strongest defense is a hard attack. That's an old Naval tradition now proving its truth on all the waters of the Seven Seas.

In similar fashion, the best defense against maintenance problems is a relentless, unceasing attack on carelessness and wear. Battery care, for example, is simplified if you observe four basic rules . . . which may be called your rules for attacking battery maintenance problems. Follow them faithfully, and remember, Buy to Last and Save to Win!

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THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia
The World's Largest Manufacturers of Storage Batteries for Every Purpose
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FOR VICTORY TODAY
AND SOUND BUSINESS TOMORROW

Get This Flag Flying Now!

This War Savings Flag which flies today over companies, large and small, all across the land means *business.* It means, first, that 10% of the company's gross pay roll is being invested in War Bonds by the workers voluntarily.

It also means that the employees of all these companies are doing their part for Victory . . . by helping to buy the guns, tanks, and planes that America and her allies *must* have to win.

It means that billions of dollars are being diverted from "bidding" for the constantly shrinking stock of goods available, thus putting a brake on inflation. And it means that billions of dollars will be held in readiness for post-war readjustment.

Think what 10% of the national income, saved in War Bonds now, month after month, can buy when the war ends!

For Victory today . . . and prosperity *tomorrow,* keep the War Bond Pay-roll Savings Plan rolling in *your* firm. Get that flag flying now! Your State War Savings Staff Administrator will gladly explain how you may do so.

If your firm has not already installed the Pay-roll Savings Plan, *now is the time to do so.* For full details, plus samples of result-getting literature and promotional helps, write or wire: War Savings Staff, Section F, Treasury Department, 709 Twelfth Street NW., Washington, D. C.

Save With

War Savings Bonds

This Space Is a Contribution to America's All-Out War Program by

STEEL

Fig. 10. (Left, above)—Insulated with ¾-inch thick sheets of asbestos this skid box permits controlled cooling of forgings. Unit here has sand on lid to improve sealing

Fig. 11. (Right)—Tiering skid boxes easily stack four-high, utilize "air" over usual storage areas to greatly increase storage capacity

tiering skid boxes, as can be seen in Fig. 11, consist of a standard-type skid platform equipped with runners and with a box section welded to the deck. To facilitate tiering, the box is equipped with brackets or ears as shown in Fig. 11. Proper underclearance is left under the skid so it can be handled with a standard-type hand-lift truck for the short spottings between operations. Long hauls and tiering of complete skid boxes are done with power fork trucks.

The skid boxes are easily tiered or stacked as many as six or seven units high. This permits using the "free storage" areas located above normal storage levels so every bit of space can be utilized and materials can be placed at points where they are needed instead of having to be transferred to central storage areas. The fork trucks are equipped with adjustable forks so they can also be utilized as ram trucks for handling coils of rod from receiving to raw material storage and from there to the first operation.

After the installation of the new handling equipment was made, it became necessary for this manufacturer to ship his product to another plant to be galvanized. The same skid boxes that had solved their internal handling problems so adequately were then put to work as shipping containers. Now lift trucks perform in a few minutes' time work that would take several hours if loading and unloading of the freight cars were done manually. This is a real production shortcut.

The next improvement was to install all-steel double-face pallets. Small bags of tire chains are stored on these in a warehouse. Heavy production being in the summer months, the all-steel pallet provides the strength and the long life needed. A wood pallet cannot be used in the hot warehouse since the boards would dry out and split. As a result, the nails would become exposed and tear the cloth bags.

Another company, whose factory was being moved from one city to another, brought approximately 30 carloads of all-steel tiering skid boxes. As soon as they were received at the old plant, they were moved into the plant. Then materials from stockrooms as well as production and plant equipment were loaded into them. Next the loaded skid boxes were put back into the car and reshipped to the new plant.

Much Time Saved

This scheme permitted considerable time to be saved in moving to the new location. Also, everything arrived in properly labeled boxes that were placed at the exact points previously decided upon, thus eliminating much confusion that usually accompanies moving parts several times on the way to their final destination. These handling units are now being used in the new plant to handle miscellaneous small stampings and castings. Since they are equipped with tiering brackets, all available storage space is put to work. See Fig. 11. A card holder is welded to each box and a label inserted, which enables the lift-truck operator to determine the contents of the box without leaving his station on the truck.

Handling of small parts through production as well as a large scrap handling problem were solved by a fork lift truck equipped with revolving fork, Fig. 9, and a large quantity of corrugated steel boxes equipped with fork channel receptacles designed with proper openings to receive the forks of the truck. The truck forks are raised with the load, and when the dumping place is reached, the forks are revolved, causing the contents of the box to be discharged. This box also is equipped with tiering brackets to allow the unit to be tiered either empty or loaded.

Steel pallets, after being given a coat of rust-resisting paint, are used by a bomber plant for outside storage of dies. Storing outside saves valuable floor space inside the plant which now can be utilized for production work. It would be impossible to use wood pallets under similar exposure conditions because of the warpage and weathering that would occur. Such storage is highly efficient when the double-faced pallets are used, for they can be stacked as many as five or six tiers high.

This matter of tiering brings up a consideration which many users fail to weigh properly when purchasing a tiering type truck. If pallet loads are only 2500 pounds, they will figure a 3000-pound capacity truck will be ample. But when they have used it a short time, they find that if they had a 6000-pound capacity truck, they could put two pallet loads on the stack with truck at maximum height, thus adding another tier to the effective "reach" of the tiering mechanism of the truck and thereby more effectively utilizing available storage areas for less space in the "air" would be wasted.

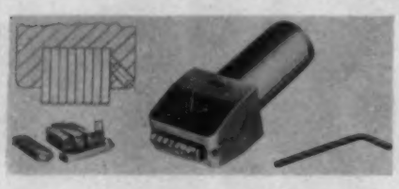
Another handling development that has been found of value is the insulated skid box. This type of box was developed for a drop forging manufacturer

(*Please turn to Page* 130)

INDUSTRIAL EQUIPMENT

Interchangeable Holder

Steel Stamps Inc., 143 Jos. Campau, Detroit, announces an interchangeable type holder suitable for mounting in mechanical or hydraulic presses of all types. It makes it possible to use a



wide variety of figures, characters and logotypes for marking parts with dates, drawing or serial numbers, code symbols, etc.

The holder utilizes the wedge lock principle, making it possible for all characters to be held rigidly both sidewise by a single socket type set screw. This prevents the type from dropping out of the holder through repeated hammering and shocks.

Body of the holder also is large and substantial to assure equal pressure along its length for all character impressions. It is machined from a solid block of steel with a separate hardened and ground anvil inserted in the bottom of the letter mortise to prevent sinking of the individual characters. The holder is offered for type sizes ranging from 1/32 up to ¼-inch in various faces.

Locomotive Jack

Whiting Corp., is offering a new portable high-lift steam and diesel locomotive jack for outdoor or indoor use. Equipped with limit switches and other

safety devices, it is capable of a 140-ton lift.

Because of its design, narrow and standard gage steam locomotives, diesel-electric locomotives or passenger cars may be quickly raised or lowered to facilitate many different operations. Slotted "feet" allow the beams to be lowered below track level. These beams are removable so that diesel locomotives may be raised by the jack "palms".

Oil Level Windows

Bijur Lubricating Corp., Long Island City, N. Y., is introducing an oil window unit, a new pre-assembly, especially devised for indicating oil level when the unit is installed in a built-in oil-reservoir casting. It consists essentially of a window of clear plastic assembled in a polished metal housing.

A special oil-proof synthetic gasket insures oil-tightness between window

and frame. Bright background of housing together with the plastic window provide sharp visibility of oil level. Two holes in the metallic background allow easy oil passage.

By means of an assembly tool, it is said, the oil window unit may be pressed into a reamed hole in the machine casting, provided the casting wall thickness is ¼ inch or more. The window unit is available in sizes to give a clear window diameter of ⅝, 1 and 1¼ inches, respectively.

Crankshaft Lathe

Wickes Bros., Saginaw, Mich., is introducing a new extra heavy duty universal type crankshaft lathe—a single end drive lathe designed for machining the intermediate main lines bearings and ends of heavy-duty diesel crankshafts having line bearings up to 8 or 10 inches in diameter.

Back roller rest of the lathe is used for supporting the bearing being machined in order to prevent deflection of the crankshaft during the machining operation. The rest is carried in a very heavy back-tool housing and is movable along the lathe bed to any position desired. A 3-way turret is mounted on the cross slide and tooling provided for turning, cheeking and filleting operations. The lathe is provided with hydraulic longitudinal feed to the carriage and with hydraulic cross feed to the cross slide. Hydraulic feeds pro-

vided are from 0.005 to 0.125 inches per revolution through variable delivery hydraulic pump.

Main drive motor, the feeds and the rapid traverses are all controlled from electric drum switches on the apron convenient for the operator. The tailstock is movable along the lathe bed for machining various lengths of crankshafts.

The lathe has a swing over the bed of 61 inches and a swing over the cross slide of 36 inches. The machine will take crankshafts up to 16 feet long, although lathe beds may be made of any length desired. The main drive motor is a 30-horsepower unit.

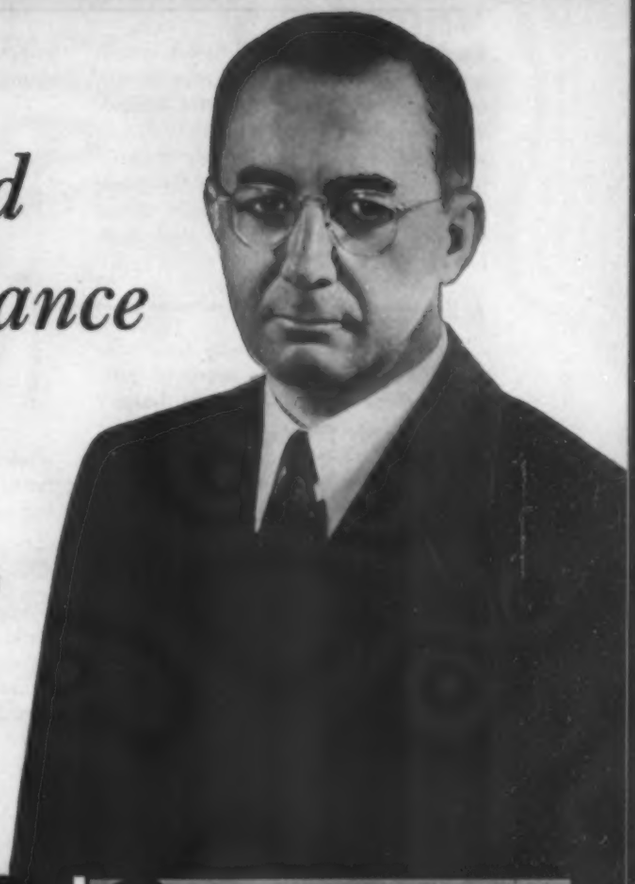
Straightening Press

Lake Erie Engineering Corp., Buffalo, is offering a new sensitive quick-acting shaft straightening press with anvils and centers for testing. Its combination hand-lever and foot-pedal con-

trol is so arranged that either may be used independently.

Pumping unit of the press is self-contained in the base of press and provides 20-ton capacity. Ram operates at high

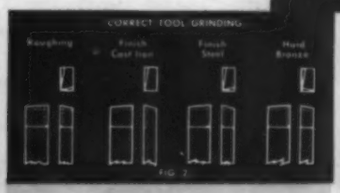
"Correct cutting speed is of the utmost importance in metal turning"



says GEORGE M. CLASS
Vice-President in Charge of Engineering
GISHOLT MACHINE COMPANY
Madison, Wisconsin

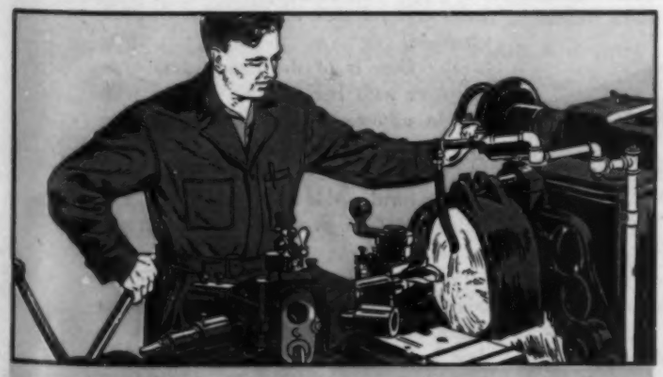
Latest Gisholt contribution to the war effort is the new Heavy-Duty Turret Lathe with time-saving Gisholt Speed Selector, which is helping American industry "MAKE IT FIT TO FIGHT."

"SELECTING THE PROPER TOOL to cut a specific kind of material is only part of a cutting operation. For the best results the machine should be operated at correct cutting speed. To select this speed properly, it should be kept in mind that the faster the rate of the cutting speed, the closer you approach the speed at which the cutting tool actually *cuts* the metal and does not just push it off the part being machined.



"TO ACHIEVE the desired clean cut, the tool used should be ground at regular intervals (Fig. 2 above). A good rule to follow is: the cutting speed for roughing tools should be maintained at a rate resulting in approximately a 4-hour tool life between grinds; with a tool life of from 8 to 12 hours between grinds for finishing tools.

"IT IS ALSO TRUE that the faster the cutting speed the better the finish on the work. For at the point of speed where the tool actually cuts the metal, in place of pushing it off, a very smooth finish will be produced. Always run as fast as the tools and the design of the work will permit.



"IT IS ALSO DESIRABLE to use a cutting lubricant that not only will keep the work and tool cool, but also will lubricate the cutting edge of the tool. This allows the chip to slide more freely over the top of the tool, thus producing a better cutting action and allowing an increase in cutting speed."

The correct cutting oil is as important to proper machine tool operation as the correct cutting speed. That's why Shell has developed a control technique that "balances" the oil to the machine, the application and the tool. Call in the Shell man now for details.

SHELL

SHELL LATA OILS
FOR METAL WORKING

speed and is arranged with quick return springs. Maximum down stroke of the ram is adjusted by the control located on the yoke. Pressure control handwheel is mounted on the front of main pedestal. The main frame of the press is built up of rolled steel side plates electrically welded from one solid rigid unit.

Milling Machine

Blank & Buxton Machinery Co., Jackson, Mich., is offering an improved milling machine which features a heavier column, knee, saddle and table. Built by Index Machine & Tool Co., the unit is sensitive enough for jobs requiring end mills of approximately ⅛-inch diameter and sturdy enough that it takes cuts with cutters up to ¾-inch diameter in

tool steel. It also is suitable for cavity and contour work.

Spindle of the machine runs on ball bearings packed in special grease so that no attention is required for a couple of years at least. The spindle head swivels 90 degrees right or left and the table is fitted with verniers cross and longitudinal. A piece 8 x 16 inches can be worked, milling, drilling and boring straight or at angles all in one setting. The machine has a 3¼-inch quill travel with power feed.

Convection Heater

General Electric Co., Schenectady, N. Y., is offering new convection heaters for use in the cabs of electric locomotives, guards in towers, and watchmen's houses around industrial plants. Controlled automatically, and rated from 2 to 15 kilowatts, they are available in the suspension type for wall and ceiling mounting.

The portable heater which, while intended primarily for floor mounting, is readily adaptable for either wall or ceiling use.

Display Cabinet

Mine Safety Appliances Co., Braddock, Thomas, and Meade streets, Pittsburgh, is offering manufacturers a new bulletin display cabinet, called the Tool-Board, for better display of wartime safety and morale posters, instructions and special messages.

Constructed of non-critical materials, the board's glass-front cabinet permits quick change of bulletin material through a novel but practical design. A pivot joint at the top permits the cover to swing up and away from the back where it is retained in an open position by a hold-out latch so that the fiber posting board can be removed or replaced easily. The board also is illuminated, and equipped with simple hardware to give efficient service. The unit measures 32 x 25 x 3½ inches, and is equipped with a glass sign with sandblasted letters reading "Safety Bulletins" or "General Bulletins".

Coolant Pumps

Atlas Press Co., Department 7, Kalamazoo, Mich., is offering two new compact, portable coolant pumps for use with any machine tool. These are said to have pumping capacities suitable to meet maximum-flow requirements of most makes of lathes, drill presses, millers,

grinders, cut-off saws, screw machines, single and multiple spindle-drilling and tapping machines. They are designed on the centrifugal principle.

A 4-bladed impeller, driven directly by the extended motor shaft, is the only moving part below the motor. The design permits control valves to be closed completely while pump is operating without injury to any part of the coolant system. The pump motors are completely enclosed and not affected by moisture or caustic solutions.

Motor shaft turns on oilite bronze bearings lubricated through capped oil cups. Each bearing is equipped with a large felt oil retainer. Coolant tanks are of heavy-gage steel, leakproof welded.

Backstand Idler

Hammond Machinery Builders Inc., 1611 Douglas avenue, Kalamazoo, Mich., is offering a new improved No. 3 backstand idler for use in conjunction with abrasive belts. It features a new spring-loaded adjusting screw and hand wheel

which maintains uniform tension on the belts and releases tension to make belt changes.

The idler is of the heavy duty type supplied with ball bearing pulleys with simple adjustment for belt positioning and tracking. The machine can be used either in right or left hand position by simply turning the idler wheel head and column 180 degrees and locking in position.

When employed with an outside diameter cylindrical finishing machine the idler can be used on such parts as bombs, universal joints, condenser tubing, shell cases, gun barrels, steel tubing,

"Tomorrow may be too late—do it today!"...CHECK UP!

THIS

MIGHT HAVE PREVENTED

THIS

WARTIME restrictions make copper products hard to get — this includes electrical wire and cable. It will pay you to protect what you have.

Anaconda's Preventive Maintenance Plan will help you check to see that cables in your plant are not being abused.

If you follow this free plan you not only help yourself, but more important, you help the war effort. This manual provides a practical automatic method for complete analysis of circuits and equipment... uncovers potential weaknesses ... methods for correcting them... with charts to enable quick periodic check-ups.

NOTE: Through this Preventive Maintenance Plan you may uncover the evidence necessary to obtain an "emergency repair priority." This is explained fully in the plan book.

ANACONDA'S PREVENTIVE MAINTENANCE PLAN

Anaconda Wire & Cable Company
25 Broadway, New York City

Please send copy of the Anaconda Preventive Maintenance Plan for safeguarding production.

Individual .....

Company .....

Address ..... City .....

brass magazines, etc., covering a range in size from ¼ to 9 inches outside diameter, straight or shouldered work.

Lift Truck

Towmotor Co., 1226 East 162nd street, Cleveland, announces a crane-arm equipped lift truck to speed the handling of motors, casting, etc. By means of the arm, loads are quickly raised from the floor, moved rapidly

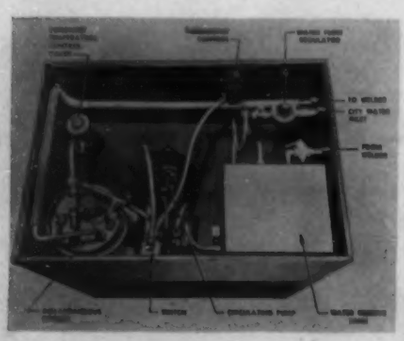
along narrow aisles and up ramps and maneuvered into position with a minimum of labor.

The crane-arm attachment is used either with or without forks. It is quickly demountable and interchangeable with standard forks so that the truck on which it is used can be diverted to special handling assignments in a few minutes.

Welder Cooler

Temprite Products Corp., 47 Piequette avenue, Detroit, announces a new Temprite 580-WC spot welder cooler which is said to elongate the life of welding tips, provide consistent uniformity of weld due to constant tip temperature and increase production of each welder.

Suitable for use with all types of spot welders on all metals, the unit is of particular importance on aluminum spot welders where the peculiar structure of the metal requires that the welder tips be maintained at a constant, controlled low temperature at all times. The cooling unit supplies a constant flow of low temperature water to electric spot welder tips and transformers. It operates as a water circulating system and can be used to operate one, two or three separate spot welders depending on the maximum heat load of the welders and the resistance to flow through the welder water circuit.



The system is capable of circulating 120 gallons of water per hour against a spot welder pressure drop of 100 pounds gage. Pump is equipped with an adjustable by-pass valve so that the rate of water flow through the spot welder assembly can be controlled. Cabinet enclosing the cooler is constructed of heavy gage furniture steel, rust proofed and finished in olive green Krinilac lacquer. Size of the cabinet is 42½ x 34½ x 23 inches.

Heavy-Duty Wheels

Metzgar Co., Grand Rapids, Mich., now is offering improved heavy-duty wheels for industrial trailer use. These are said to have an added capacity of 51 to 20 per cent.

Some refinements of the wheels include a more scientific arrangement in the number of wedges; also employing

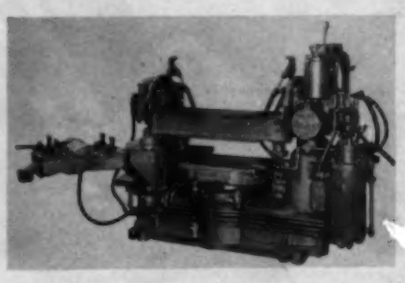
the use of 5/16 instead of ¼-inch rivets. Wheels are being offered in a range of sizes from 2½ to 20 inches in diameter, fitted with either oilless end-wood bearings, or antifriction bearings. They are especially suitable for use in forts and arsenals or where explosive conditions exist.

Molding Machine

Machine Division, Osborn Mfg. Co., Cleveland, announces an improved molding machine which permits women to work in foundries.

The machine—one that is capable of producing molds for latest type cylinder heads for airplane engines, now is equipped with a special mechanism which mechanically performs the roll-over operation. This operation, to roll over the machine table carrying a pattern and a half flask of sand, was a man operator's hardest task. The effort takes about a 75-pound pull, which, according to company, is little too tough a job for a 90 to 100-pound woman.

With the embodiment of this mechanism, a woman operator need only



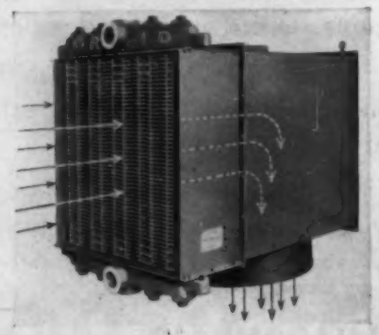
open an air valve and then give the rollover table a slight manual start. This manual feature was retained as a safety factor and the operation is performed easily and safely.

Nature of these molds is such that any shock during the rollover operation would damage the delicate sand sections between cylinder fins and result in a scrap casting. To control this situation the company produced the power roll-over mechanism around a double-acting hydraulic piston using air on oil as a source of power and providing an oil cushion at both ends of the stroke. Consequently the mold is rolled over with a smooth positive motion from which all starting or stopping shock is eliminated.

Unit Heater

D. J. Murray Mfg. Co., Wausau, Wis., is introducing a new Grid unit heater which now features a down-blow principle in its construction. Arrows in the illustration indicates the flow of air through the unit.

Special features of the heater include protection of the motor from the radiant



heat of the unit itself, preventing motor burn-out. In it no electrolysis to cause corrosion can be developed, as each fin heating section is high test iron, cast in one piece, so only one type metal comes into contact with steam or hot water, the company reports.

This part produced in ONE forming cut by the

OSTER NO. 601

"RAPIDUCTION" TURRET LATHE

The part illustrated is one of numerous examples of heavy forming cuts obtained with the SIMPLIFIED Oster No. 601 "RAPIDUCTION" Turret Lathe, equipped with WORM DRIVE.

The hardened and ground steel worm, like the spindle, is mounted in ball bearings. A smooth, even flow of power is transmitted through a bronze worm wheel to the spindle. This smooth flow of power makes possible exceptionally heavy forming cuts with absence of chatter. (For high speed work on small diameters and non-ferrous materials, a DIRECT DRIVE is provided. Spindle speeds up to 3000 R. P. M. are obtained.)

The 6-station turret is now equipped with AUTOMATIC INDEXING. Price of complete machine is unchanged (Under $2000 without tools, F. O. B. Factory). The form below offers a convenient way to obtain full details QUICKLY. *Use it!*

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★ O.K. Oster. We're interested in the No. 601 machine. ( ) Send Catalog No. 601. ( ) Ask your nearest distributor to see us at once. (Check either or both of above requests.)

NAME .....

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To all who would like to obtain IngAclad . . .

We are sorry we cannot supply your present needs for IngAclad Stainless-Clad Steel, unless you are in the fortunate position of holding high-rated war orders. You will be glad to know, however, that every ton you are denied today is serving America in actual war work . . . on the sea in ships galleys . . . in the camps as jacketed food kettles . . . and in speeding and protecting Food Products, Chemicals, Textiles, etc. for the fighting services.

IngAclad makes good consumer products better, and protects them at every handling stage. Plan now to take advantage of the economies IngAclad offers when peace comes.

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INGACLAD
STAINLESS-CLAD STEEL
AND INGERSOLL SOLID STAINLESS STEEL

The Women—

(*Concluded from Page 87*)

to apply make-up during working hours."

The girls are typical of the thousands of young women who are moving into jobs ordinarily strange to feminine workers as men moved out for military service. A large share of them have husbands, brothers, sons or fathers in the Army, Navy or Marine Corps. And one had a brother killed at Pearl Harbor. The women are eager to learn what they are making, proud of their work and proud of having a part in the war production effort.

"They actually feel they are doing some real work to help win the war," says the plant manager, "and they seem more eager to do more work and do it well than most men we have had on those jobs. I suppose that is because many of them have a lot of imagination and want to make a real contribution to winning the war. They feel this is the best way they can do it."

Specifications

(*Continued from Page 89*)

Emergency Alternate Specifications which have played such an important part in the conservation of more critical materials. Interestingly enough, many of these emergency materials have proved superior to those originally specified and will unquestionably continue to be used after the conclusion of the war. Indeed the inclusion of many of these emergency materials in the basic specification is now being contemplated. Where such Emergency Specifications are used by Army Ordnance — and a considerable number of applications are practicable — each such application must be approved by the responsible design section lest any lessening of quality influence safety or military efficiency, a possibility which cannot be tolerated. . . . Finally we have the

United States Army Specifications, which cover special military items as well as materials and articles of a commercial character. These are prepared by the responsible supply arm or service, co-ordinated with all interested supply arms and services of the Army and then cleared for procurement by Headquarters, Service of Supply. Those which cover commercial materials and articles are also thoroughly co-ordinated with industry.

By way of contrast to Federal Specifications, United States Army Specifications require much less time for preparation and revision and hence are more flexible. In only a few instances has the War Department prepared or retained

United States Army Specifications. Where this has been done, the greater flexibility necessary for wartime procurement has been a governing consideration.

Tentative Specifications: Those specifications which serve the temporary purpose of covering items of ordnance *materiel* and the materials necessary to their manufacture pending the completion of United States Army or Federal Specifications are known as "Tentative Specifications". Such specifications are co-ordinated with the Ordnance Department and are approved in accordance with instructions of the Chief of Ordnance, those covering commercial articles and materials being carefully co-ordinated with industrial practice.

A principal advantage of this particular group is the rapidity with which preparation and revision can be accomplished when required; hence, their application to items which are under development or subject to further changes in technical requirements, instead of United States Army or Federal Specifications.

Just as soon as any particular item or material becomes standardized, a United States Army or, in some cases, a Federal Specification is prepared, and the Tentative Specification cancelled. Most tentative specifications used by the Ordnance Department bear a serial number prefixed by one of the following designations indicating the office of origin, viz:

AXS—Office, Chief of Ordnance, Washington, D. C.

FXS—Frankford Arsenal, Philadelphia.

PXS—Picatinny Arsenal, Dover, N. J.

RIXS—Rock Island Arsenal, Rock Island, Ill.

SXS—Springfield Armory, Springfield, Mass.

WXS—Watertown Arsenal, Watertown, Mass.

WVXS—Watervliet Arsenal, Watervliet, N. Y.

In the past, efforts toward standardization have often met with resistance on account of variation in manufacturing practices of organizations concerned. It must be admited that standardization must be in the nature of a compromise in order to be successful. In our present situation, in which we are confronted on the one hand with the necessity of making the best use of the materials available and on the other of purchasing astronomical quantities for war use, a certain flexibility and adaptability on the part of the purchasing department in the drawing of specifications must be accompanied by an insistence on adherence to their provisions in order

On the BEAM 2 WEEKS DELIVERY on Johnson Furnaces

Don't waste precious time waiting for the heat-treating equipment you need. Today, order from Johnson, who can give you two weeks delivery. For more than 40 years Johnson Furnaces have been on the beam, providing heat for industry and its needs.

No. 130A Heat-Treating Furnace

For quick, accurate heat-treating of high-speed steels, get this Johnson No. 130A. Counterbalanced door opens upward, allowing tools to be put in or removed from furnace without fully opening door, thus preventing temperature drops. Carbofrax hearth and ¼ H.P. blower. Lined with insulating refractory. Available with 4 or 6 burners, for various temperatures from 1400 degrees to 2400 degrees F. Firebox 7¾" high, 13" wide, 16½" long. 4-burner job illustrated, $295. 6-burner job, $325. Prices F.O.B. Factory.

Johnson can offer you heat-treating furnaces for hi-speed steel in both bench and pedestal types, and various firebox sizes. Send for complete catalog.

NO. 120
Firebox 5" high, 7¾" wide, 13½" long.
$129.50
F. O. B. Factory

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Firebox 5½" high, 13" wide, 13½" long.
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STOP THESE HIDDEN LEAKS
THAT *WASTE YOUR DOLLARS...*

Hundreds of Plants Effect Big Savings with Carey HEAT INSULATIONS

One pair of bare, 10-inch flanges at 350° F., waste one ton of coal per year. One foot of bare, 10" steam pipe, heated to 700° F., can cost you heavy heat loss. Figuring steam cost at 30c per million B. T. U., insulation 3" thick, shows an annual saving of $24.76 per foot of pipe.

Many industrial plants have hidden profit leaks in the form of waste in production, or excessive overhead. While these leaks may be small in themselves, they may add up to a very costly total.

Heat loss, through inadequately insulated pipe, is one of the most common of these hidden profit leaks. Scientific tests show, and hundreds of installations prove, that from 70% to 98% of this loss may be saved by correct insulation.

Fortunately for industry, there is a practical way, not only to find these wastes, but also to eliminate them. The Carey organization is equipped to help you uncover the profit leaks in your plant. A phone call or letter to our nearest branch, will bring a representative. Catalog "Heat Insulation for Industry" mailed on request to Dept. 71.

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that planning to meet our material requirements may be a practical possibility instead of a calculated guess. We are, in effect, between the devil of a shortage and the perils attendant upon doubtful expedients which might place men's lives or the issue of a battle in jeopardy.

All through the work of the United States Army Ordnance Department in the conservation of essential materials, one observes a cautious but flexible attitude toward the substitution of the more readily available for the more critical—if purer—substance. For example, early in the program, the War Production Board cataloged aluminum into several grades or qualities, the classification depending upon the type and quantity of impurities such as copper, iron, manganese, zinc, magnesium, etc., which they contained.

Five Kinds of Aluminum Used

Primary aluminum (or virgin metal) and the scrap from the primary grade (now used for the same purposes) are almost exclusively allocated for aircraft production. A third grade contaminated with impurities in undesirable percentages as far as aircraft construction is concerned is still of adequate quality for incendiaries and flares. Another grade is too impure for this latter purpose but well adapted to the production of aluminum diecastings. Finally, a fifth grade, unsuited to any of these purposes is yet applicable to use in sand castings of moderate strength and has been so classified.

Prior to the war, primary aluminum was used for all of these purposes (some sand castings excepted). The third grade (of incendiaries and flare quality) is allocated by the WPB; while Ordnance Department specifications cover aluminum of diecasting and sand-casting quality.

Thus through the medium of specifications, material is directed toward applications for which it is entirely adequate, the purer metal being conserved for other essential needs.

It is of interest to note that the sluggishness of the diecasting quality caused manufacturing difficulties and some rejections.

However, by increasing the silicon content progressively up to a maximum of 9½ per cent a material every whit as satisfactory as the original virgin metal was found to be obtained. The high-pressure casting practice called for in the specification, together with improvements in techniques by the industry, has resulted in even greater density and soundness of castings.

(Concluded Next Week)

Sabotage, Espionage

(*Concluded from Page 92*)

tions, the beams of invisible light are often made to criss-cross the area to be protected by means of focusing mirrors which reflect light projected by the light source.

Signal systems for indoor installations may be connected to a centrally located signal board which will indicate the room in which trespass has occurred.

In some plants it is as important to guard against espionage as against sabotage. Drafting rooms, experimental laboratories, testing laboratories, etc., may contain information of tremendus value to our enemies. Such places may be successfully guarded by photoelectric trespass traps even in cases where there is no installation in surrounding rooms. Espionage agents may accomplish their missions in many cases without carrying away anything—except the knowledge which is in their own minds—hence they leave no clues and no evidence that they have committed their crimes.

Steel companies and all metalworking plants would do well to awaken to the dangers which confront them and take all possible precautionary measures against saboteurs and espionage agents. *This is war. Enemy agents are loose in this country.*

Peace Plans Discussed

Peace Plans and American Choices, by Arthur C. Millspaugh; cloth, 107 pages, 5½ x 8 inches; published by the Brookings Institute, Washington, for $1.

A democratic peace, made democratically, implies a great popular debate on the questions and issues involved. The most important relate to means by which world order may be securely established and war abolished. Numerous proposals for durable peace have been advanced, each with its advocates and critics. Discussion already is under way.

The author in this book, without stating his own opinions, sets up and describes about a dozen typical peace plans and gives main arguments for and against each.

Private Electric Plants

Private Generating Plant, edited by E. Molloy, editor of *Electrical Engineer*; cloth, 151 pages, 5½ x 8½ inches; 59 illustrations; published by Chemical Publishing Co. Inc., Brooklyn, N. Y., for $2.50.

Included in this work are emergency and standby systems. It deals with generating plants and emergency lighting and power systems for factories, hospitals, theaters, institutions, stores, offices and country homes, with notes on installation, operation and maintenance. Wind-driven plants also are covered.

WAR Puts a Premium on KNOWING HOW

★ Thorough familiarity with the contents of the following books will place you in the "know how" class . . . prepare yourself now for tomorrow's demands . . . broaden your knowledge of your industry.

ROLL PASS DESIGN

by Trinks (Two volumes and Supplement.)

VOL. I: (New Third Edition), 201 pages, 7 tables, 139 drawings, $5. Covers general rules and laws governing roll design in relation to sections, and principles governing entrance and deformation of bars. Elementary and advanced instruction and theory are covered.

SUPPLEMENT, $1.50, includes additional information available since publication of Vol. II. Recommended for owners of other volumes only.

VOL II, 246 pages, 21 tables, 7 charts, 176 illustrations, $6. Covers theoretical and practical reasons for the shape and size of rolls, compares different methods of rolling given sections and illustrates application of principles.

PICKLING OF IRON & STEEL

by Wallace G. Imhoff, 195 pages, 46 illustrations, $5. Various phases of pickling room practice as well as details of construction and maintenance of pickling equipment are presented. The author tells the story of surface preparation of steel for coating in a simple but practical manner discussing various steps in the process that will interest many operators in the sheet, tin, pipe, wire, strip, seamless tube, enameling, hollow ware, galvanizing and lead coating industries.

HOT DIP GALVANIZING PRACTICE

by W. H. Spowers, Jr., 189 pages, 45 illustrations, 7 folding charts, 4 tables, $4. Discusses theory of zinc coating and covers practical methods of galvanizing. Tells how to reduce dross losses. Kettle design, control of oxidation, fluxing materials, the bobbin wipe in fine wire production, chemical reactions, fluxing, flux washes and pyrometry are covered.

TOOL ROOM GRINDING

by Fred B. Jacobs, 221 pages, illustrated, $3.50. Here is a treatise that tells how grinding operations are performed to advantage in a modern tool room. Operations involved in grinding arbors, counterbores, reamers, milling cutters and precision gages as well as diemaking details and the procedure for salvaging small tools are explained in a concise manner.

THEORY & PRACTICE OF ROLLING STEEL

(Second Edition), by Tafel. 304 pages, 165 illustrations, 12 tables, $4.50. Covers roll pass design and layout of rolling mills and mill drives. Fully describes proper methods of calculation, design and wear. Pass designs for flats, skelp and squares as well as for roughing mills are considered.

OPEN HEARTH FURNACE

(Three Volumes), by Buell.—Complete set $10.
VOL. I, (New Second Edition), 276 pages, 60 tables, 69 illustrations, $4. Covers the design, construction and practice of open hearth furnaces.
VOL. II, 260 pages, 42 tables, 68 illustrations, $4. Gives the metallurgical, chemical and thermal factors of operation affecting design.
VOL. III, 308 pages, 56 tables, 114 illustrations, $4. A comparison of the ancillary systems of selected existing open-hearth furnaces and the development of basic design principles.

THE MANUFACTURE OF STEEL SHEETS

by Edward T. Lawrence, 244 pages, 116 illustrations, 9 tables, 6 x 9 inches, $4.50. Describes in detail the sequence of operations in making steel sheets on conventional type mills, from the open hearth furnace to the finished product, with special reference to high grade sheets. Influence of various methods upon quality of product and causes and elimination of defects are discussed.

INTRODUCTION TO THE STUDY OF HEAT TREATMENT OF METALLURGICAL PRODUCTS

by Albert Portevin, 246 pages, 69 illustrations, 4 tables, 6 x 9 inches, $5. Presents fundamental knowledge and essential principles of heat treatment of steel in a simple and understandable manner, without resorting to formulas.

GRINDING WHEELS & THEIR USES

by Johnson Heywood, 374 pages, 351 illustrations, 6 x 9 inches, $3. A practical book on modern grinding and polishing practice and theory. Convenient arrangement of subject matter and cross-indexing makes it valuable as a ready-reference guidebook. Includes a glossary of trade names.

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Electrical Developments

(*Concluded from Page 98*)

All contractors and vibrators with their necessary maintenance have been eliminated.

In addition. this system makes possible a completely co-ordinated and factory assembled equipment wherein it is only necessary for the purchaser to supply alternating-current power. Three of these new amplidyne arc furnace control equipments were placed in operation and four more are being built.

New magne-blast air circuit breakers were developed with improved operating mechanisms so as to withstand the severe operating requirements for such applications.

Due to the scarcity of tin, attention has been focused on the building of electrolytic tinplating lines which require only one-third as much tin as the older hot-dip process. One of the important advances in this application is the use of copper oxide rectifiers for supplying low-voltage direct-current power for the plating. These rectifiers are built in 5000-ampere units and are completely factory assembled, including the transformers for stepping down from 440 volts and a recirculating ventilating system. There are no moving parts except the ventilating fans, and the units are so constructed that the bus runs between them and the contact rolls can be considerably simplified and shortened. In addition, they are so light that they can be set on a standard industrial-type floor requiring no special foundation. Three lines, involving 180,000 amperes of rectifiers, are now being built.

Another novel feature of this application is the use of saturable reactors for maintaining and regulating the voltage output of the rectifiers in proportion to the line speed.

A number of auxiliary drives employing adjustable-voltage control have been built.

These units utilize standard shunt-wound generators and amplidyne control to obtain the desired operating characteristics in place of the special 3-field generators which have been employed in the past. With this new type of control it is possible to obtain more output from the same size motors and generators than with the use of previous types of control.

New systems of control of the amplidyne type have been developed and applied to large mine and blast furnace skip hoists. The success of this control in giving increased production and better operating characteristics with fewer devices has led to its further extension in this field.

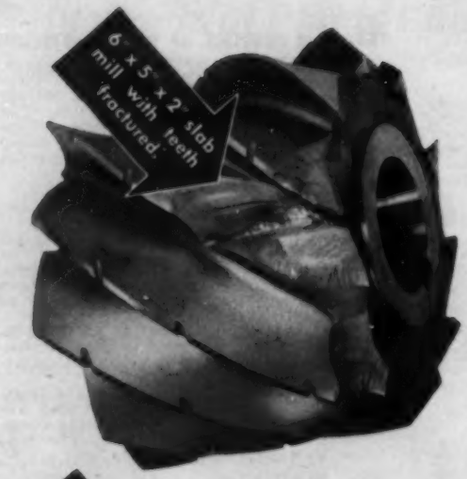
A special generator developed for use with crane-hoist drives provided many new improvements. Among these are: High-speed hoisting of empty hook, adjustable and not too fast for reliable limit switch operation; definite and adjustable stalling point to limit overloads below mechanical capacity of the crane; relatively flat speed-load curves for low-speed hoisting; flat speed-load curves for low-speed lowering where precise handling is required; and high-speed lowering of empty hook with speeds decreasing as load increases.

An ore bridge now being built will utilize air-operated contactors instead of magnetically-operated contactors, because of the size of contactors needed and to conserve space.

A simple self-regulating system for maintaining control voltages on ore bridges also was developed and successfully applied.

The desire to expedite jobs and unify responsibility led to the steel industry's placing a greater number of jobs on a so-called "turnkey" basis, where the electrical manufacture was made responsible not only for the engineering and building of the equipment but also for the preparation of installation drawings as well as the supervisiion of the installation itself.

DON'T SCRAP



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Erection Shortcut

(*Concluded from Page* 108)

and 114 feet long resting on and joined to the upright columns. The entire cycle of placing a platform, pouring, drying and shifting forward required seven days. Week by week, batteries of such forms moved down the length of the plant site, leaving roof and columns in place.

In effect, the building was then an open shed. Brick walls, windowless for blackout, were placed around the exterior.

The only walls inside block off the special departments, such as the heat-treating section. As fast as the rolling platforms were out of the way, the ground was leveled and a concrete floor poured directly on the dirt, without reinforcing steel. An additional 450 tons of steel was saved in this manner.

Further savings in steel and other vital materials were obtained by using asbestos-cement pipes. Ventilation and air distribution ducts are of pressed wallboard.

Concrete or vitreous tile sewers were installed instead of cast iron pipes. Many electrical conduits are formed of fiber cast in concrete. Inspection tables and tool cribs are of wood instead of metal. Coal is used in the heating plant, and three-quarters of the boilers were obtained from surplus equipment put out of service by wartime requirements.

The entire plant is being laid out for in-line mass production. Raw materials enter one end of the building and while in process of fabrication move directly down machine tool lines toward the assembly floor and test cells at the other end of the building. Each engine part is manufactured in a separate production line of machine tools, and each line is tooled up with high-production type tools for one specific part.

Die Casting Technique Discussed for Engineers

Die Casting for Engineers; cloth, 148 pages, 6 x 9 inches; published by New Jersey Zinc Co., 160 Front street, New York, for $1.

In preparation of this book the publishers made every effort to present an impartial analysis of all the many alloys in use so that the engineer may make an intelligent utilization of the inherent advantages of the process itself. Zinc is treated simply as one of the metals lending itself to this process.

In recent years the process of die casting was recognized as one of the leaders among modern high-speed production methods in the metalworking industry. This volume is to aid students as well as engineers who wish to become more familiar with a process which has not yet reached its full development.

Metals and alloys available for die-casting include zinc, aluminum, magnesium, copper, lead and tin. Elements of die construction are treated at length and discussion is included on applications, specifications, inspection and tests, methods and tools for flash removal, machining practice and jigs and fixtures for machining the castings.

Considerable attention is given to finishes for the castings and also to design, an important factor since the mold is a rigid structure from which the casting must be removed easily.

GE Offers Manual On Motor Fitness

Information on how to get the most from motors is included in a new 36-page "Motor Fitness Manual" compiled recently by General Electric Co., Schenectady, N. Y. It is organized to aid plants converted to war production.

The manual embodies suggestions on; how to select and apply motors; what types to use; method of protection; how to maintain electric motors for longer life and peak performance; approximate full-load currents of motors, etc.

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Skid, Pallet Handling

(*Concluded from Page* 117)

who was having a high percentage of rejects due to flaking in the cooling process. The former method of slow cooling was to bury the hot forgings in an ash pit. This was unreliable as cooling could not be controlled, was objectionable because of dust and fumes, and costly by reason of the large amount of manual effort involved in the handling processes.

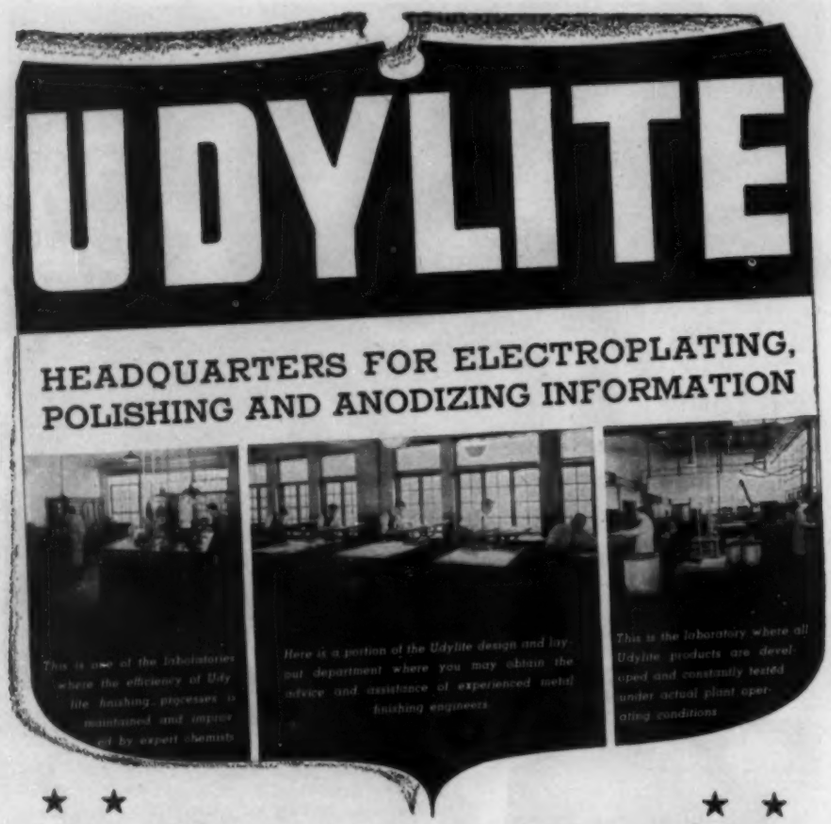
By placing these forgings in an insulated metal skid box such as shown in Fig. 10, cooling can be controlled to eliminate flaking. Also fumes and dust are eliminated. And by handling a box full as a unit, handling costs are greatly reduced.

Both the skid platform and the box of these handling units are made of 7-gage steel. The inside of the box is separated from the outside liner by a ¾-inch layer of asbestos sheet. Lids are insulated the same way. The box is provided with crane lifting lugs. This allows handling it with cranes or power lift trucks for long hauls and stacking, while hand lift trucks can be used for spotting operations.

In Fig. 10 one of these insulated skid boxes is being transferred from the heat-treating department to the storage area of a large forging producer. This user finds that a layer of sand on top of the lid affords a more effective seal and also allows placing the forgings closer to the top of the box. In this way, the largest portion of the cubical content of the box is utilized.

Another interesting application of the skid box system of handling is shown in Figs. 7 and 8. These illustrate a special skid box made with a yoke which permits it to be dumped when suspended from an overhead hoist. This type of skid box is particularly suitable for moving chips out to scrap loading areas. The suspension yoke is hinged far enough down to be below the center of gravity of the skid box when it is loaded. Thus to discharge the box, the operator merely unlocks the latch that holds the box upright, the box then tipping to empty its contents.

When empty, the box is easily swung to the upright position where it can be locked for further handling operations. It is not necessary for the operator to hold the box as shown in Fig. 8. In actual operation, the operator trips the latch and the unit swings free. Since the box is pivoted about its center of gravity when empty, it is a simple matter to return it to the upright position after it has discharged all of its contents.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Aircraft Process Practice Handbook of Gas Welding

Process Practices in the Aircraft Industry, by Frank D. Klein Jr.; cloth, 266 pages, 6 x 9 inches, published by McGraw-Hill Book Co. Inc., 330 West Forty-second street, New York, for $2.75.

The author attempted to fill the need for a reference and instruction book, with supplementary descriptive literature, concerning the processes, methods and materials employed in the aircraft industry.

Owing to the continual development and changes in design, corresponding changes have been made in these factors in the last few years.

The separate sections are arranged as nearly as possible in the chronological sequence in production flow so that the reader may follow the airplane or part from raw stock to final acceptance or test.

The work first takes up description of characteristic aircraft raw materials, describes aircraft metals, fabrics and compositions and process materials. This is followed by description of standard process methods, which is gone into in much detail. Numerous illustrations and tables supplement the text.

Posters To Help Combat Tool Breakage

To help combat the increase in tool breakage in war factories, Genesee Tool Co., Fenton, Mich., recently developed a series of educational posters to impress workers with the importance of proper tool handling and care.

The posters depict dramatically the effect of tool breakage on the war effort. Their basic theme is the phrase "There is just so much tool steel available". In appeal however, there is a wide differentiation between different posters, since investigation revealed no single type of appeal is equally effective with all workers.

In three colors, measuring 2-1/3 x 3½ feet, the posters are being offered without charge. The company plans to present a new poster bi-monthly in order that a fresh appeal to workers may be maintained continuously.

Ten Rules on Keeping Motors Running

Electric motors, termed the "muscles of industry" by Safety Research Institute, New York, if regularly serviced, will give dependable, long-time service. The following are ten commandments of motor maintenance as recommended by the institute:

I. Open-type motors should be blown out weekly; those operating under severe conditions, daily. Use no more than fifty pounds of pressure to avoid possible damage to insulation.

II. Follow manufacturer's instructions in lubricating motors. Too much oil is as bad as too little, causing deterioration of insulation.

III. Inspect bearings weekly or oftener. Feel temperatures, examine for excessive end play, and make certain oil rings are working.

IV. Inspect brushes and commutators weekly or oftener. Make certain brushes are seated perfectly and commutators are smooth. Use proper grade of carbon brushes to prevent wear of commutator and reduce sparking.

V. Where motors operate with excessive belt tension, check air gap between rotor and stator every week. A monthly check of motors in average use is sufficient. Difference in width of gap around circumference of rotor will indicate extent of wear on bearings.

VI. Where motor leads are exposed to view, check them weekly to see that connections are tight, well insulated and free from oil.

VII. Inspect ground connections weekly, keeping them tight and in good condition. This is for the protection of employes, and for the proper operation of over-current protective devices.

VIII. Set up a regular schedule for overhauling motors. Most motors should be overhauled annually, while those in severe use should be overhauled twice a year or oftener.

IX. Dismantle motor for a complete overhaul job. Wash all parts with carbon tetrachloride or some other safety solvent. Paint the windings with a good, oil-resisting insulating varnish.

X. Keep area around motor as clean as the motor. Arcing frequently ignites oil material that has not been cleaned up.

In event fire breaks out in or around a motor, the institute adds, shut off the power before attacking the fumes, if possible. Do not depend upon the circuit breaker operating or a fuse blowing out, but shut off the power. This will minimize fire to the motor and prevent continued arcing from re-igniting the fire. When the motor or conductors are dead, direct the fire-extinguishing agent, vaporizing liquid or carbon dioxide, into the motor or upon whatever is burning, just as in any other fire.

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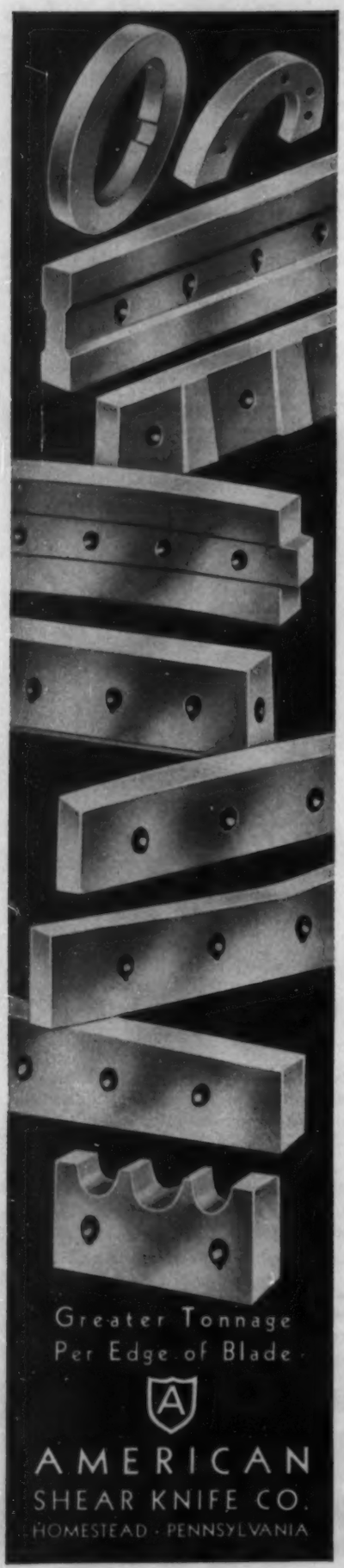

Revised Recommendations On Hand Tools Available

Printed copies of several recently revised simplified practice recommendations are now available, according to the Division of Simplified Practice, National Bureau of Standards, Washington. These are on shovels, spades, scoops, and telegraph spoons, forged axes, forged light hammers and forged hatchets, and are identified as R48-42, R158-42, R159-42, R160-42 respectively.

The recommendations were revised at the suggestion of and in co-operation with the War Production Board for conserving critical materials, to make the available supply go as far as possible; also to conserve labor and machine-time.

The simplified lists of items as given in these recommendations are incorporated in Limitation Order L-157, "Hand Tools Simplification", issued by WPB. recommendation R48-42 is given in Schedule 1, and recommendations R158-42, R159-42, and R160-42 are given in Schedule II of the limitation order.

As revised, recommendation R48 permits manufacture of approximately 370 varieties of shovels, spades, scoops, and spoons, or approximately 34 percent of the 1100 items which, it is estimated, the industry has been producing. Recommendation R158 lists 150 sizes of axes, or 39 percent of the 384 varieties formerly offered for sale.

Number of sizes of forged light hammers in the current revision of recommendation R159 is 141 as compared with 180 in the previous edition, a reduction of about 22 percent; and the number of sizes of hatchets, broad axes, and axes has been reduced from 89 to 57 in the new edition of recommendation R160.

Tables for Machinists

Machine Speeds and Feeds, compiled by Howard Tyler & Co. Ltd.; cloth, 131 pages, 4½ x 6½ inches; published by Chemical Publishing Co. Inc., Brooklyn, N. Y., for $2.25.

A collection of tables and data relating to machining operations on cast iron, steels, alloy steels, aluminum, aluminum alloys and other nonferrous metals. It also contains 19 tool-form charts.

The tables were compiled for the guidance of machine operators undertaking new jobs on new materials. They do not purport to give the highest possible figures, which would normally be dictated by a production office. So far as possible the tables group the information required for each type of machine in the easiest form for quick reference.

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Cornell U Issues Paper on Specific Heats of Gases

"The Specific Heats of Certain Gases Over Wide Ranges of Pressures and Temperatures" is the title of bulletin No. 30, a recent publication of Cornell University Engineering experiment station, Ithaca, N. Y. It contains general equations which determine the effect of pressure on the specific heats of the gases, within ranges of temperature and pressure encountered most frequently in engineering practice.

Gases considered include air, carbon dioxide, carbon monoxide, ethylene, hydrogen, methane, nitrogen and oxygen; the temperature range included is from 0 to 4000 Fahr.; and the pressure range is from 0 to 10,000 pounds per square inch. Single copies of the paper may be secured without charge by writing to the university, however, additional copies sent to the same person are 50 cents each.

Booklets on Grinding To Aid "Green" Men

Four booklets—one on cylindrical, portable, centerless and tool room grinding—were recently issued by Sterling Grinding Wheel Division, Tiffin, O., for aiding "green" workmen in their wartime jobs. These represent the first of a contemplated series on grinding with the company's wheels.

Metallurgy of Steel Explained in Text

Ferrous Production Metallurgy, by John L. Bray; cloth, 457 pages 6 x 9 inches; published by John Wiley & Sons Inc., 440 Fourth avenue, New York, for $4.

Believing there is a need in metallurgical courses for a textbook devoted solely to production of iron and steel, the author provided this text for use in a junior or senior course. His aid has been to fit fundamental theories into successful practice, each being explained from a physico-chemical standpoint.

The text contains condensed descriptions of equipment, accompanied by simple line drawings, to avoid confusion created by multiplicity of detail involved in use of working drawings. It is intended to be used in class with lantern slides. Statistical material is kept at a minimum and includes only important countries and significant years.

Throughout the book suggestions for using physical chemistry are made in the form of simple problems. Incident to the general subject a comprehensive history of the origin and development of the iron and steel industry is presented.

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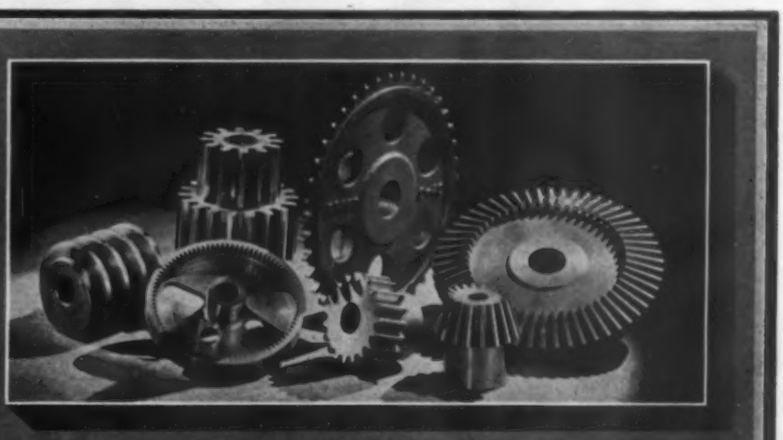

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NE Alloy Steels

(*Concluded from Page* 106)

NE-9420 at a J-32 value.

It should be noted that an increase in carbon content of the analysis can change a hardenability without regard to the alloy content. This is illustrated in Fig. 3 for a molybdenum steel.

By the use of Fig. 1, which roughly translates the end quench test data to round bar total quench data, Table II can be set up to show the approximate size to which the tensile values in Figs. 2 and 5 can be applied. It should be understood that the tensile strength at 32 rockwell C would not be at 200,000 pounds per square inch as shown in Figs. 2 and 5, but would be about 140,000 pounds per square inch.

Table II would indicate that NE-9420 could be substituted for 4023, 4027 and 5120, and very probably for 2317, 3115, 4032, 4119, 4125, 4620 and 6120 where core strength is a consideration. It would not take the place of 2515, 4320 or 4815.

Properties in the Carburized Condition: Fig. 6 shows the carbon gradients for the NE and a number of other standard alloy compositions obtained from 1-inch cylinders carburized for 8 hours in coke-charcoal barium-carbonate energized compound of the following composition: Barium, 7.8 per cent; sodium, 0.1; calcium, 0.44; iron, 0.7.

It will be noted that the NE-9420 and the other NE steels carburize in a normal manner and do not have the sometimes undesirable characteristics of 4120 and 6120 and to a lesser degree 5120 which exhibit a tendency to build up carbon content on the surface.

The carbon content 0.010-inch below the surface is shown in Fig. 10. These data are taken from Fig. 6.

As certain alloys increase the rate of carburization and others decrease the rate of carburization, it is important to know the relative rates of carburization.

Fig. 13 was taken from the data shown in Fig. 6. It indicates the case depth to 0.050-per cent carbon after a given time reading. It is seen from Fig. 13 that NE-9420 with a silicon range of 0.40 to 0.60 per cent does not have a retarded rate of carburization.

Hardenability-Carburized: The relative hardenability of the steel in the carburized condition is shown in Figs. 11 and 15. Fig. 11 shows the relative hardenability after carburizing for 8 hours at 1700 degrees Fahr. and end quenching in water.

From Fig. 11, certain conclusions can be drawn. They are that NE-8720 is comparable with 2515 and 4815 and that NE-9420 is comparable with 2317, 3115, 4119 and 6120 and has a higher hardenability than the 4000 molybdenum, the 1300 manganese and the 5100 chromium steels.

The data in Fig. 15 are for end-quench specimens carburized at 1700 degrees Fahr. for 8 hours, quenched in oil and reheated to 1480 degrees Fahr. and quenched in water.

From Fig. 15, the following conclusions can be arrived at regarding these steels: That none of the NE steels is comparable with 2515 and 4815, and that NE-8020, 8620 and 9420 closely approach 4620 and 4320, although they are not absolutely comparable.

In using the data in Fig. 15, it must be understood that the various alloy combinations exhibit a different behavior depending on the holding time before quenching and also on the reheating temperature used. If some reheating temperature other than 1480 degrees Fahr. is used, the hardenability at the particular temperature will vary somewhat and should be determined.

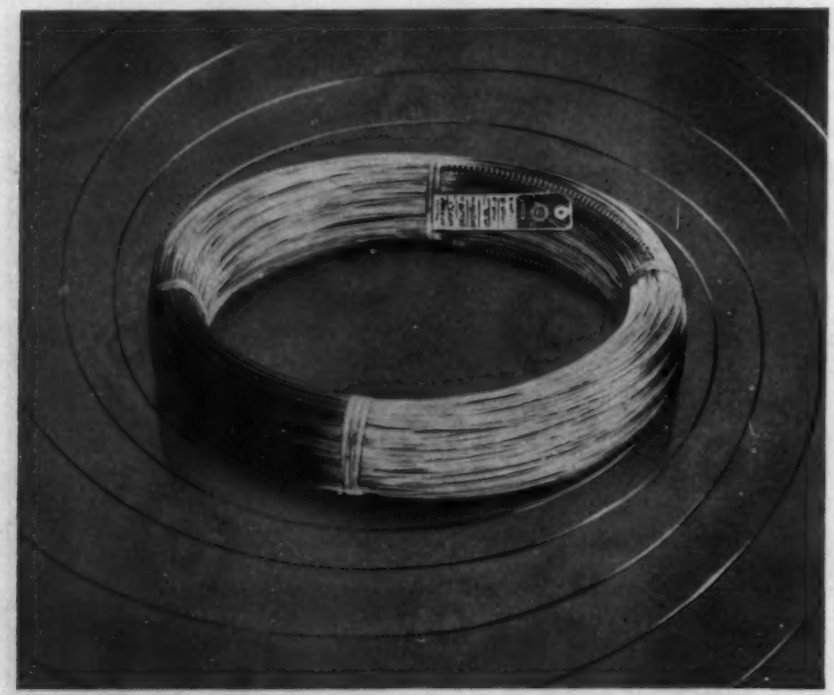
The effect of the reheating temperature on the hardenability of NE-9420 as well as a number of alloy compositions is shown in Fig. 17.

Fig. 14 gives a rough sketch of a few parts which are now made from AISI NE-9420 steel.

Some further information as to the method of manufacture, material and heat treatment as well as the material replaced by AISI NE-9420 is given in Table III.

TABLE III—Method of Manufacture, Material and Heat Treatment Data on Items in Fig. 15 Made from AISI NE-9420 Steel

Part No.	Method of Manufacture	Material: Size (Inch)	Material: Condition	Heat Treatment	NE-9420 Replaces
1	Automatic screw machine	3½ Rd.	Cold drawn	Carburized and hardened to 62-65 rockwell C	A-4615
2	Forging	1 Rd.	Hot Rolled	Carburized and hardened to 79-84 rockwell A	3415, A-4615
3	Automatic screw machine	¾ x 1¼	Cold drawn	Carburized and hardened to 60-64 rockwell C	A-4023
4	Automatic screw machine	3/16 Rd.	Cold drawn	Carburized and hardened to 57-62 rockwell C	A-4623
5	Automatic screw machine	3⅛ Rd.	Cold drawn	Carburized and hardened to 60-64 rockwell C	A-4023
6	Automatic screw machine	.249 Rd.	Cold drawn	Carburized and hardened to 60-64 rockwell C	A-2317
7	Automatic screw machine	1⅞ Rd.	Cold drawn	Carburized and hardened to 79-84 rockwell A	A-4615
8	Automatic screw machine	1 1/16 Rd.	Cold drawn	Carburized and hardened to 60-64 rockwell C	A-4023



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ASTM Book Combines All Standards for Steel Pipe

For the first time, it reports, the American Society for Testing Materials, 260 South Broad street, Philadelphia, compiled recently in one compact 256-page volume all of its specifications covering steel piping materials.

Ten of these cover boiler, superheater and miscellaneous tubes, many of which are incorporated in the society's boiler code and other codes. Also included are 15 specifications covering various types of pipe for service at normal and elevated temperatures, and five standards on still tubes for refinery service and heat-exchanger and condenser tubes.

To make the publication complete there are five specifications covering castings widely used for valves and related materials, four pertain to forgings and fittings, three cover carbon and alloy-steel nuts and bolting material, and for convenience, the standard austenite grain size chart (E 19) is embodied in the book.

To expedite procurement and conserve critical and strategic materials, many ASTM emergency alternate provisions were issued in the piping field. These are now incorporated as part of this book. Copies of the publication can be obtained from the society headquarters at $1.75 per copy.

New Treatise on Blast Furnace Raw Materials

The Blast Furnace, by Roy P. Hudson; 254 pages, 5½ x 8½ inches; published by Chemical Publishing Co. Inc., Brooklyn, N. Y., for $3.75.

Here is a treatise that delves into the treatment of blast furnace raw materials in a thorough manner such as iron ore, limestone, dolomite, coal and coke. The preparation, quality and evaluation of metallurgical coal and coke are dealt with in considerable detail in Part I which closes with ways and means of calculating a blast furnace burden.

Part II dealing in a general way with such products and by-products as pig iron, ferroalloys, slag and gas, is offered for the sake of completeness.

Part III is devoted to the sampling and analysis of ore, limestone, pig iron, ferroalloys, slag and gas by methods which have been proved by the author to be reasonably rapid and accurate.

Considerable material in the book was written from observation and personal experience while the author was engaged in blast furnace practice and as a coal inspector for the American Rolling Mill Co. in Southern Ohio. This volume should be of interest to many practical men related to this field.

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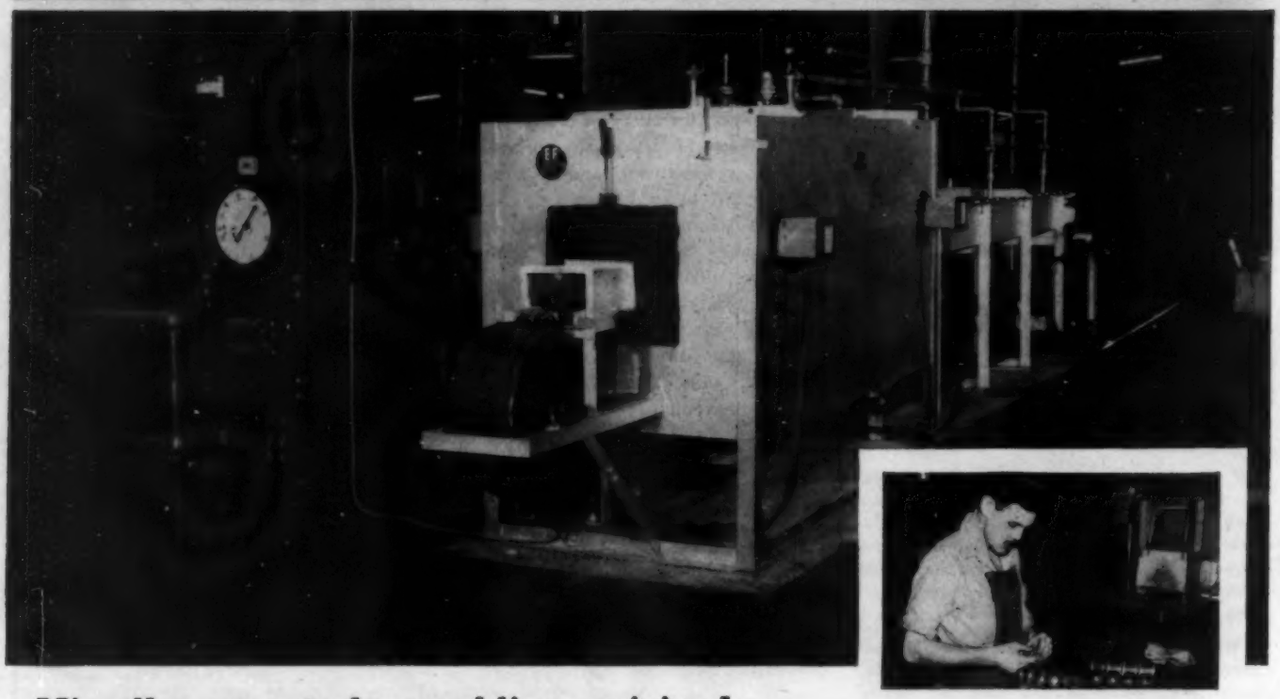
THE WELLMAN BRONZE & ALUMINUM COMPANY
General Offices
2539 East 93rd St. Cleveland, Ohio

Wellman
MEANS WELL-CAST

EF FURNACES

For Every Industrial Heat Treating Process



The operator assembles the parts and places them on the furnace conveyors.

Miscellaneous steel assemblies are joined

60 to 75% faster at ¼ the former labor cost

by the Copper Brazing Process

"Greatly improved results—neater, stronger joints—60 to 75% faster, at about one quarter the former labor cost," that briefly is the report received from the production manager of a prominent midwestern plant after installing the above E F continuous copper brazing furnace for joining some of their steel assemblies.

Within a month after installing their first brazing furnace, a second similar but larger furnace was ordered for joining other products—the illustration at right below shows both furnaces operating side by side, joining all kinds of assemblies—large and small—neatly, economically and securely.

The assemblies are discharged at the other end... all units securely and neatly joined.

Products difficult or expensive to make in one piece can be made in several pieces and joined — thus not only reducing the cost but actually improving the quality and appearance. Products requiring several stampings joined or requiring screw machine parts, forgings and stampings to complete the unit, can be neatly and economically joined right in the production line in your shop.

Any number of joints in the same product or any number of pieces can be joined at one time. The most intricate parts or assemblies are made to actually "grow together," and joints made which are as strong, or even stronger than the original parts. On some parts it is possible to anneal and braze in one operation.

Investigate the brazing process for your products. With slight changes in design you may be able to join your metal parts, neater, cheaper and stronger by this method.

The satisfactory results from the first furnace at left sold the larger furnace at right.

Send for printed matter showing this and other types of EF furnaces.

Investigate the Copper Brazing Process For Joining YOUR Metal Parts

The Electric Furnace Co., Salem, Ohio

Gas Fired, Oil Fired and Electric Furnaces---For Any Process, Product or Production

MARKET SUMMARY

Steel Demand More Stable; Deliveries Still Deferred

Semifinished supply for essential needs is improved. . . Bars continue most needed product. . . Urgency numbers appear on some orders. . . Beehive coke may advance

DEMAND
Buying more stabilized.

PRODUCTION
Down ½-point to 98½ per cent.

PRICES
Some shading on scrap.

DEMAND for steel is becoming stabilized as war goods manufacturers convert their allotments under Production Requirements Plan into mill orders and the volume being placed varies little from earlier quarters, some mills receiving a little more and others less.

The general delivery situation has not changed materially, alloy steels being most extended. In carbon steels shipments on billets and large rounds are most delayed, with nothing available for first quarter except on directives and little promise for anything earlier than the middle of second quarter on high priorities. Small rounds with high ratings can be had in five to six weeks. Structural shape delivery has receded to six or eight weeks because of diversion of semifinished steel to other uses, rather than to increased building activity. Hot-rolled sheets can be had in about five weeks, cold-rolled in five to six weeks and galvanized sheets in about seven weeks, though some sheetmakers can not do as well as this.

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• A flurry of plate buying was experienced last week as consumers completed their applications for March tonnage, which were due Feb. 1. Most sellers found their customers asked an increase, attributed to shipbuilding needs and railroad requirements.

A new development is the appearance of urgency numbers identifying certain projects and giving precedence over priority ratings. These have been few and apparently apply to synthetic rubber and high-octane gasoline projects and are accompanied by information as to delivery dates and time of completion of the projects.

Steel production last week declined ½-point to 98½ per cent as necessity for open-hearth repairs reduced the number of units in service. Wheeling advanced 2½ points to 82½ per cent, Cleveland 1 point to 92 and Birmingham 5 points to 100 per cent. Pittsburgh fell back ½-point to 97 per cent, Chicago 2 points to 100½, St. Louis 1 point to 92 and eastern Pennsylvania 2 points to 94 per cent. Production was maintained unchanged at Buffalo, 93 per cent; Cincinnati, 95; Detroit, 93; Youngstown, 97; New England, 95.

Restrictions on use of various steel products has reduced demand to such an extent that better semifinished supply is available for other forms of steel of more importance to the war effort. Dwindling demand for structural steel and reinforcing bars is increasing tonnage available for plates, bars and sheets, for which requirements continue heavy. Backwardness of tin can manufacturers in placing their orders for tin plate is reducing production of the latter and steel otherwise destined for that use is being diverted to sheets and bars. This delay in placing tin plate orders may bring a period of order congestion later, as food pack requirements this year will be heavy.

Scrap continues to flow in volume sufficient to meet all needs and a backlog remains in dealers' yards as assurance of continued supply for some time. The latter is not being prepared as rapidly as usual under weather and labor conditions. Back of the yard stocks are considerable collections amassed during the household drive which have not been picked up by dealers. When pressure for increased supply is resumed these will furnish considerable tonnage. Meanwhile, industrial scrap is being gathered and some plants have made new records in tonnages turned in. Borings and turnings continue a troublesome factor and prices continue to be shaded in some areas, as much as $2 under ceilings being offered by some consumers. Remote scrap is not as easily sold as a few months ago, heavier freight charges making it less desirable when supply is available nearer home.

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More general change to six days per week in the coal fields is expected to result in higher coal prices and may bring an increase of 50 cents per ton in ceiling prices on beehive coke produced from trucked coal in hand-drawn ovens. Some difficulty has been experienced in quality of beehive coke, resulting from use of inferior coal used because of higher freight costs on more distant better grade fuel.

Better supply of fluorspar is expected this year to meet metallurgical demand, War Production Board announcing entry of five new producers, who are expected to provide 60,000 tons per year to increase domestic supply.

Composite steel and iron prices are steady at ceiling levels set by Office of Price Administration. Finished steel composite is $56.73, semifinished steel $36, steelmaking pig iron $23.05 and steelmaking scrap $19.17.

COMPOSITE MARKET AVERAGES

	Jan. 30	Jan. 23	Jan. 16	One Month Ago Dec., 1942	Three Months Ago Oct., 1942	One Year Ago Jan., 1942	Five Years Ago Jan., 1938
Finished Steel	$56.73	$56.73	$56.73	$56.73	$56.73	$56.73	$62.18
Semifinished Steel	36.00	36.00	36.00	36.00	36.00	36.00	40.00
Steelmaking Pig Iron	23.05	23.05	23.05	23.05	23.05	23.05	22.92
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.17	14.10

Finished Steel Composite:—Average of industry-wide prices on sheets, strip, bars, plates, shapes, wire, nails, tin plate, standard and line pipe. **Semifinished Steel Composite:**—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. **Steelmaking Pig Iron Composite:**—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. **Steelworks Scrap Composite:**—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material

	Jan. 30, 1943	Dec. 1942	Oct. 1942	Jan. 1942
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.49	2.49	2.49	2.47
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.22	2.22	2.22	2.22
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.15	2.15	2.15
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pittsburgh	2.60	2.60	2.60	2.60
Tin plate, per base box, Pittsburgh	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.55

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods No. 5 to $\frac{9}{32}$-inch, Pittsburgh	2.00	2.00	2.00	2.00

Pig Iron

	Jan. 30, 1943	Dec. 1942	Oct. 1942	Jan. 1942
Bessemer, del. Pittsburgh	$25.19	$25.19	$25.19	$25.19
Basic, Valley	23.50	23.50	23.50	23.50
Basic, eastern, del. Philadelphia	25.39	25.39	25.39	25.34
No. 2 fdry., del. Pgh., N.&S. Sides	24.69	24.69	24.69	24.69
No. 2 foundry, Chicago	24.00	24.00	24.00	24.00
Southern No. 2, Birmingham	20.38	20.38	20.38	20.38
Southern No. 2, del. Cincinnati	24.30	24.30	24.30	24.06
No. 2X, del. Phila. (differ. av.)	26.265	26.265	26.265	26.215
Malleable, Valley	24.00	24.00	24.00	24.00
Malleable, Chicago	24.00	24.00	24.00	24.00
Lake Sup., charcoal, del. Chicago	31.54	31.54	31.54	31.34
Gray forge, del. Pittsburgh	24.19	24.19	24.19	24.19
Ferromanganese, del. Pittsburgh	140.65	140.65	140.65	125.33

Scrap

Heavy melting steel, Pitts.	$20.00	$20.00	$20.00	$20.00
Heavy melt. steel, No. 2, E. Pa.	18.75	18.75	18.75	18.75
Heavy melting steel, Chicago	18.75	18.75	18.75	18.75
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00	20.00

Coke

Connellsville, furnace, ovens	$6.00	$6.00	$6.00	$6.20
Connellsville, foundry, ovens	7.25	7.25	7.25	7.25
Chicago, by-product fdry., del.	12.25	12.25	12.25	12.25

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941 and Feb. 4, 1942. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold-rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal established basing points for selected products are named specifically. All seconds and off-grade products also are covered. Exceptions applying to individual companies are noted in the table. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00.
(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel ingots at $33 gross ton, f.o.b. mill.)

Alloy Steel Ingots: Pittsburgh base, uncropped, $45.00.

Rerolling Billets, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $34.00; Detroit, del. $36.25; Duluth (bil.) $36.00.
(Wheeling Steel Corp. allocated 21,000 tons 2" square, base grade rerolling billets under lease-lend during first quarter 1942 at $37, f.o.b. Portsmouth, O.; Andrews Steel Co. may quote carbon steel slabs $41 gross ton at established basing points.)

Forging Quality Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $40.00; Detroit, del. $42.25; Duluth, $42.00.
(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points.)

Open Hearth Shell Steel: Pittsburgh, Chicago, base 1000 tons one size and section: 3-12 in., $52.00; 12-18 in., $54.00; 18 in. and over, $56.00.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54.00.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $34.00.
(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel sheet bars at $39 gross ton, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Pt., Youngstown, Coatesville, lb., $1.90.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, No. 5—9/32 in., inclusive, per 100 lbs., $2.00.
Do., over 9/32—47/64-in., incl., $2.15. Worcester add $0.10 Galveston, $0.27. Pacific Coast $0.50 on water shipment.

Bars

Hot-Rolled Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, base 20 tons one size, 2.15c; Duluth, base 2.25c; Detroit, del. 2.27c; New York del. 2.51c; Phila. del. 2.49c; Gulf Ports, dock 2.52c, all-rail 2.59c; Pac. ports, dock 2.50c; all rail 3.25c. (Phoenix Iron Co., Phoenixville, Pa., may quote 2.35c at established basing points.) Joslyn Mfg. Co. may quote 2.35c, Chicago base. Calumet Steel Division, Borg Warner Corp., may quote 2.35c, Chicago base, on bars produced on its 8-inch mill.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.)

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethhlehem, base 20 tons one size, 2.70c; Detroit, del., 2.82c.
(Texas Steel Co. may use Chicago base price as maximum f.o.b. Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.10	4100 (.15-.25 Mo)	0.55
		(.20-.30 Mo)	0.60
2300	1.70	4340	1.70
2500	2.55	4600	1.20
3000	0.50	4800	2.15
3100	0.70	5100	0.35
3200	1.35	5130 or 5152	0.45
3400	3.20	6120 or 6152	0.95
4000	0.45-0.55	6145 or 6150	1.20

*Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.65c; Detroit 2.70.

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.95c; Detroit, del. 3.47c.

Turned, Ground Shafting: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base (not including turning, grinding, polishing extras) 2.65c; Detroit 2.72c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.27c; Gulf ports, dock 2.52c, all-rail 2.61c; Pacific ports, dock 2.80c, all-rail 3.27c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, base 2.15c; Detroit, del. 2.27c; Gulf ports, dock 2.52c, all-rail 2.61c; Pacific ports, dock 2.80c, all-rail 3.25c.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel reinforcing bars 2.33c, f.o.b. mill.)

Iron Bars: Single refined, Pitts. 4.40c, double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, common, 2.15c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.10c; Granite City, base 2.20c; Detroit del. 2.22c; Phila. del. 2.28c; New York del., 2.35c; Pacific ports 2.65c.
(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O. base.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.17c; New York del. 3.41c; Phila. del 3.39c; Pacific ports 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.50c; Granite City, base 3.60c; New York del. 3.74c; Phila. del. 3.68c; Pacific ports 4.05c.
(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.31c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage, not corrugated, copper alloy 3.60c; copper iron 3.90c, pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh 4.25c.

Enameling Sheets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 10 gage.

base 2.75c; Granite City, base 2.85c; Pacific ports 3.40c.

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 20 gage, base 3.35c; Granite City, base 3.45c; Pacific ports 4.00c.

Electrical Sheets, No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.20c	3.95c	3.30c
Armature	3.55c	4.30c	3.65c
Electrical	4.05c	4.80c	4.15c
Motor	4.95c	5.70c	5.05c
Dynamo	5.65c	6.40c	5.75c
Transformer			
72	6.15c	6.90c	.....
65	7.15c	7.90c	.....
58	7.65c	8.40c	.....
52	8.45c	9.20c	.....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base, 1 ton and over, 12 inches wide and less 2.10c; Detroit del. 2.22c; Pacific ports 2.75c. (Joslyn Mfg. Co. may quote 2.30c, Chicago base.)

Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.92c; Worcester base 3.00c.

Commodity C. R. Strip: Pittsburgh, Cleveland, Youngstown, base 3 tons and over, 2.95c; Worcester base 3.35c.

Cold-Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed 4.05c.

Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c.

Manufacturing Ternes: (Special Coated) Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.

Roofing Ternes: Pittsburgh base per package 112 sheets, 20 x 28 in., coating I.C., 8-lb. $12.00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16.00; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.10c; New York, del., 2.30-2.55c; Phila., del., 2.15c; St. Louis, 2.34c; Boston, del., 2.42-67c; Pacific ports, 2.65c; Gulf Ports, 2.47c. (Granite City Steel Co. may quote carbon plates 2.35c, f.o.b. mill. Central Iron & Steel Co. may quote plates at 2.20c, f.o.b. basing points.)

Floor Plates: Pittsburgh, Chicago, 3.35c; Gulf ports, 3.72c; Pacific ports, 4.00c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c.

Wrought Iron Plates: Pittsburgh, 3.80c.

Shapes

Structural shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del., 2.28c; Phila., del., 2.22c; Gulf ports, 2.47c; Pacific ports, 2.75c. (Phoenix Iron Co., Phoenixville, Pa. may quote carbon steel shapes at 2.30c at established basing points and 2.50c, Phoenixville, for export.)

Steel Sheet Piling: Pittsburgh, Chicago, Buffalo, 2.40c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufacturers in carloads (add $2 for Worcester):

Bright basic, bessemer wire	2.60c
Galvanized wire	2.60c
Spring wire	3.20c

Wire Products to the Trade:

Standard and cement-coated wire nails, polished and staples, 100-lb. keg	$2.55
Annealed fence wire, 100 lb.	3.05
Galvanized fence wire, 100 lb.	3.40
Woven fence, 12½ gage and lighter, per base column	.67
Do., 11 gage and heavier	.70
Barbed wire, 80-rod spool, col.	.70
Twisted barbless wire, col.	.70
Single loop bale ties, col.	.59
Fence posts, carloads, col.	.69
Cut nails, Pittsburgh, carloads	$3.85

Pipe, Tubes

Welded Pipe: Base price in carloads to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

	Butt Weld Steel			Butt Weld Iron	
In.	Blk.	Galv.	In.	Blk.	Galv.
⅛	56	33	¼	24	3½
⅛ & ⅜	59	40½	⅜	30	10
½	63½	51	1-1¼	34	16
⅝	66½	56	1½	38	18½
1-3	68½	57½	2	37⅛	18

	Lap Weld Steel			Lap Weld Iron	
In.	Blk.	Galv.	In.	Blk.	Galv.
2	61	49½	1¼	23	3½
2½-3	64	52½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½, 3½	31½	14½
9-10	64½	52	4	33½	16
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet, f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O. D. Sizes	B.W.G.	Seamless Hot Rolled	Seamless Cold Drawn	Lap Weld Steel	Lap Weld Charcoal Iron
1"	13	$ 7.82	$ 9.01	.....	.....
1¼"	13	9.26	10.67	.....	.....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2¼"	12	16.01	18.45	15.16	.....
2½"	12	17.54	20.21	16.58	26.57
2¾"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	.....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	.....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $40.00.

Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $40.00.

*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $28-$30.

Supplies: Angle bars, 2.70c; tie plates, 2.15c; track spikes, 3.00c; track bolts, 4.75c; do. heat treated, 5.00c.

*Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, base, cents per lb.: Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.

High Speed Tool Steels:

Tung.	Chr.	Van.	Moly.	Pitts. base, per lb.
18.00	4	1	-	67.00c
1.5	4	1	8.5	54.00c
	4	2	8	54.00c
5.50	4	1.50	4	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

CHROMIUM NICKEL STEEL

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
311	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	.....	.....
*316	40.00	44.00	48.00	40.00	48.00
*317	50.00	54.00	58.00	50.00	58.00
†321	29.00	34.00	41.00	29.25	38.00
‡347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50

STRAIGHT CHROMIUM STEEL

403	21.50	24.50	29.50	21.25	27.00
**410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
‡‡430F	19.50	22.50	29.50	18.75	24.50
442	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00

STAINLESS CLAD STEEL (20%)

304	.....	‡‡18.00	19.00	.....

*With 2-3% moly. †With titanium. ‡With columbium. **Plus machining agent. ††High carbon. ‡‡Free machining. ‡‡Includes annealing and pickling.

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.

Extras mean additions or deductions from base prices in effect April 16, 1941.

Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price, plus all-rail freight may be charged.

Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price. **Emergency basing point** is the basing point at or near the place of production or origin.

Seconds, maximum prices: flat-rolled rejects 75% of prime prices; wasters 75%, waste-wasters 65%, except plates, which take waster prices; tin plate $2.80 per 100 lbs.; terne plate $2.25; semifinished 85% of primes; other grades limited to new material ceilings.

Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941.

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.

Carriage and Machine

½ x 6 and smaller	65½ off
Do., ⅝ and ⅞ x 6-in. and shorter	63½ off
Do., ⅝ to 1 x 6-in. and shorter	61 off
1⅛ and larger, all lengths	59 off
All diameters, over 6-in. long	59 off
Tire bolts	50 off
Step bolts	56 off
Plow bolts	65 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Nuts

Semifinished hex.	U.S.S.	S.A.E.
⅞-inch and less	62	64
⅛-1-inch	59	60
1⅛-1⅛-inch	57	56
1⅛ and larger	56	..

Hexagon Cap Screws

Upset 1-in., smaller	64 off
Milled 1-in., smaller	60 off

Square Head Set Screws

Upset, 1-in., smaller	71 off
Headless, ¼-in., larger	60 off
No. 10, smaller	70 off

Piling

Pittsburgh, Chicago, Buffalo 2.40c

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham

Structural	3.75c
⅞-inch and under	65-5 off
Wrought washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l.	$2.75-3.00 off

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	*$6.00
Connellsville, foundry	7.00- 7.50
Connellsville prem. fdry.	7.25- 7.60
New River, foundry	8.00- 8.25
Wise county, foundry	7.50
Wise county, furnace	6.50

By-Product Foundry

Kearny, N. J., ovens	12.15
Chicago, outside delivered	11.50
Chicago, delivered	12.25
Terre Haute, delivered	12.00
Milwaukee, ovens	12.25
New England, delivered	13.75
St. Louis, delivered	†12.25
Birmingham, ovens	8.50
Indianapolis, delivered	12.00
Cincinnati, delivered	11.75
Cleveland, delivered	12.38
Buffalo, delivered	12.50
Detroit, delivered	12.25
Philadelphia, delivered	12.38

*Operators of hand-drawn ovens using trucked coal may charge $6.50, effective Aug. 12, 1942. †$12.75 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	15.00c
Toluol, two degree	28.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c
Per lb. f.o.b. works	
Phenol (car lots, returnable drums)	12.50c
Do. less than car lots	13.25c
Do. tank cars	11.50c
Eastern Plants, per lb.	
Naphthalene flakes, balls, bbls., to jobbers	8.00c
Per ton, bulk, f.o.b. port	
Sulphate of ammonia	$29.20

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941. Exceptions indicated in footnotes. Allocation regulations from WPB Order M-17, expiring Dec. 31, 1942. Base prices bold face, delivered light face. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

	No. 2 Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$25.00	$24.50	$26.00	$25.50
Newark, N. J., del.	26.62	26.12	27.62	27.12
Brooklyn, N. Y., del.	27.65	....	.....	28.15
Birdsboro, Pa., del.	25.00	24.50	26.00	25.50
Birmingham, base	†20.38	†19.00	.....	.....
Baltimore, del.	25.67	.....	.....	.....
Boston, del.	25.12	.....	.....	.....
Chicago, del.	‡24.47	.....	.....	.....
Cincinnati, del.	24.30	22.92	.....	.....
Cleveland, del.	24.12	23.24	.....	.....
Newark, N. J., del.	26.24	.....	.....	.....
Philadelphia, del.	25.51	25.01	.....	.....
St. Louis, del.	‡24.12	23.24	.....	.....
Buffalo, base	24.00	23.00	25.00	24.50
Boston, del.	25.50	25.00	26.50	26.00
Rochester, del.	25.53	.....	26.53	26.03
Syracuse, del.	26.08	.....	27.08	26.58
Chicago, base	24.00	23.50	24.50	24.00
Milwaukee, del.	25.17	24.67	25.67	25.17
Muskegon, Mich., del.	27.38	....	.....	27.38
Cleveland, base	24.00	23.50	24.50	24.00
Akron, Canton, O., del.	25.47	24.97	25.97	25.47
Detroit, base	24.00	23.50	24.50	24.00
Saginaw, Mich., del.	26.45	25.95	26.95	26.45
Duluth, base	24.50	24.00	25.00	24.50
St. Paul, del.	26.76	26.26	27.26	26.76
Erie, Pa., base	24.00	23.50	25.00	24.50
Everett, Mass., base	25.00	24.50	26.00	25.50
Boston	25.50	25.00	26.50	26.00
Granite City, Ill., base	24.00	23.50	24.50	24.00
St. Louis, del.	24.50	24.00	.....	24.50
Hamilton, O., base	24.00	23.50	.....	24.00
Cincinnati, del.	24.68	24.68	.....	25.35
Neville Island, Pa., base	24.00	23.50	24.50	24.00
‡Pittsburgh, del., No. & So. sides	24.69	24.19	25.19	24.69
Provo, Utah, base	22.00	21.50	.....	.....
Sharpsville, Pa., base	24.00	23.50	24.50	24.00
Sparrows Point, Md., base	25.00	24.50	.....	.....
Baltimore, del.	26.05	.....	.....	.....
Steelton, Pa., base	.....	24.50	.....	25.50
Swedeland, Pa., base	25.00	24.50	26.00	25.50
Philadelphia, del.	25.89	25.39	.....	26.39
Toledo, O., base	24.00	23.50	24.50	24.00
Mansfield, O., del.	26.06	25.56	26.56	26.06
Youngstown, O., base	24.00	23.50	24.50	24.00

*Basic silicon grade (1.75-2.25%), add 50c for each 0.25%. †For phosphorus 0.70 and over deduct 38c. ‡Over 0.70 phos. §For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenridge 1.24.

High Silicon, Silvery

6.00-6.50 per cent (base) $29.50

6.51-7.00	$30.50	9.01- 9.50	$35.50
7.01-7.50	31.50	9.51-10.00	36.50
7.51-8.00	32.50	10.01-10.50	37.50
8.01-8.50	33.50	10.51-11.00	38.50
8.51-9.00	34.50	11.01-11.50	39.50

F.o.b. Jackson county, O., per gross ton, Buffalo base prices are $1.25 higher. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton. (For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling irons, Nos. 5 and 6.)

Charcoal Pig Iron

Northern

Lake Superior Furn. $28.00
Chicago, del. 31.54

Southern

Semi-cold blast, high phos., f.o.b. furnace, Lyles, Tenn. $28.50
Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn. 33.00

Gray Forge

Neville Island, Pa. $23.50
Valley, base 23.50

Low Phosphorus

Basing points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $29.50 base; $30.81, delivered, Philadelphia.

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differentials: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorous Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorous content of 0.70% and over.

Manganese Differentials: Basing point prices subject to an additional charge not to exceed 50 cents a ton for each 0.50% manganese content in excess of 1.0%.

Ceiling prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Pittsburgh Coke & Iron Co. (Sharpsville, Pa. furnace only) and Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic, Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $1 per ton, effective April 20, 1942. Chester, Pa., furnace of Pittsburgh Coke & Iron Co. may exceed basing point prices by $2.25 per ton, effective July 27, 1942.

Refractories

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick	
Super Quality	
Pa., Mo., Ky.	$64.00
First Quality	
Pa., Ill., Md., Mo., Ky.	51.30
Alabama, Georgia	51.30
New Jersey	56.00
Ohio	43.00
Second Quality	
Pa., Ill., Md., Mo., Ky.	46.85
Alabama, Georgia	38.00
New Jersey	49.00
Ohio	36.00
Malleable Bung Brick	
All bases	$59.85
Silica Brick	
Pennsylvania	$51.30
Joliet, E. Chicago	58.90
Birmingham, Ala.	51.30
Ladle Brick (Pa., O., W. Va., Mo.)	
Dry press	$31.00
Wire cut	29.00
Magnesite	
Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00
Basic Brick	
Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.	
Chrome brick	$54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00
Fluorspar	

Fluorspar

Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail $25.00-28.00
Do., barge 25.00-28.00
No. 2 lump 25.00-28.00

(Prices effective Nov. 23, 1942)

Ferroalloy Prices

Ferromanganese: 78-82%, carlots, gross ton, duty paid, Atlantic ports, $135; Del. Pittsburgh $140.65; f.o.b. Southern furnaces $135; Add $6 per gross ton for packed carloads $10 for ton, $13.50 for less-ton and $18 for less than 200-lb. lots, packed.

Spiegeleisen: 19-21%, carlots per gross ton, Palmerton, Pa. $36.

Electrolytic manganese: 99.9% plus, less ton lots, per lb. 42.00c. Ton lots 40.00c. Annual contracts 38.00c.

Chromium Metal: Per lb. contained chromium in gross ton lots, contract basis, freight allowed, 98% 80.00c, 88% 79.00c. Spot prices 5 cents per lb. higher.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, f.o.b. Niagara Falls, N. Y. $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: 66-70%; per lb. contained chromium in carloads, freight allowed, 4-6% carbon 13.00c; ton lots 13.75c; less-ton lots 14.00c; less than 200-lb. lots 14.25c. 66-72%, low carbon grades:

	Car loads	Ton lots	Less ton	200 lbs.
2% C.	19.50c	20.25c	20.75c	21.00c
1% C.	20.50c	21.25c	21.75c	22.00c
0.20% C.	21.50c	22.25c	22.75c	23.00c
0.10% C.	22.50c	23.25c	23.75c	24.00c

Spot is ¼c higher

Chromium briquets: Contract basis in carloads per lb., freight allowed 8.25c; packed 8.50c; gross ton lots 8.75c; less-ton lots 9.00c; less 200-lb. lots 9.25c. Spot prices ¼-cent higher.

Ferromolybdenum: 55-75%, per lb. contained molybdenum, f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Calcium Molybdate (Molyte): 40-45%, per lb. contained molybdenum, contract basis, f.o.b. Langeloth and Washington, Pa., any quantity, 80.00c.

Molybdic Oxide Briquets: 48-52%, per lb. contained molybdenum, f.o.b. Langeloth, Pa., any quantity 80.00c.

Molybdenum Oxide: 53-63%, per lb. contained molybdenum in 5 and 20 lb. molybdenum contained cans, f.o.b. Langeloth and Washington, Pa., any quantity 80.00c.

Molybdenum Powder: 99% per lb. in 200-lb. kegs, f.o.b. York, Pa. $2.60; 100-200 lb. lots $2.75; under 100-lb. lots $3.00.

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrophosphorus: 23-26%, based on 24% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Mt. Pleasant, Tenn.; contract price $75, spot $80.

Ferrosilicon: Contract basis in gross tons per carload, bulk, freight allowed; unitage applies to each 1% silicon above or below base.

	Carloads	Ton lots
50%	$ 74.50	$ 87.00
Unitage	1.50	1.75
75%	135.00	151.00
Unitage	1.80	2.00
85%	170.00	188.00
Unitage	2.00	2.20
90-95%	10.25c	11.25c

Spot prices ¼-cent higher.

Silicon Metal: Contract basis per lb., f.o.b. producers' plants, freight allowed; 1% iron; carlots 14.50c, ton lots 15.00c, less-ton lots 15.25c, less 200 lbs. 15.50c.

Silicon Metal: Contract basis per lb.; 2% iron; carlots 13.00c, ton lots 13.50c, less-ton lots 13.75c, less 200 lbs. 14.00c. Spot prices ¼-cent higher.

Silicon Briquets: Contract basis; in carloads, bulk freight allowed, per ton $74.50; packed $80.50; ton lots $84.50; less-ton lots per lb. 4.00c; less 200-lb. lots per lb. 4.25c. Spot ¼-cent per lb. higher on less-ton lots; $5 per ton higher on ton lots and over.

Silicomanganese: Contract basis freight allowed, 1½% carbon; in carloads per gross ton $135; ton lots $147.50. Spot $5 per ton higher.

Silico-manganese Briquets: Contract basis in carloads per pound, bulk freight allowed 5.80c; packed 6.05c; ton lots 6.30c; less-ton lots 6.55c; less 200-lb. lots 6.80c. Spot prices ¼-cent higher.

Ferrotungsten: Carlots, per lb. contained tungsten, $1.90.

Tungsten Metal Powder: 98-99%, per lb. any quantity $2.55-2.65.

Ferrotitanium: 40-45%, f.o.b. Niagara Falls, N. Y., per lb. contained titanium; ton lots $1.23; less-ton lots $1.25. Spot 5 cents per lb. higher.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20%, Contract basis, per gross ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and North of Baltimore and St. Louis, 6-8% carbon $142.50; 3-5% carbon $157.50.

Ferrovanadium: 35-40%, contract basis, per lb. contained vanadium, f.o.b. producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Vanadium Pentoxide: Technical grade, 88-92 per cent V_2O_5; contracts, any quantity, $1.10 per pound V_2O_5 contained; spot 5 cents per pound higher.

Zirconium Alloys: 12-15%, contract basis, carloads bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot $5 per ton higher.

Zirconium alloy: 35-40%, contract basis, carloads in bulk or package, per lb. of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot ¼-cent higher.

Alsifer: (Approx. 20% aluminum, 40% silicon, 40% iron) Contract basis, f.o.b. Niagara Falls, N. Y., per lb. 7.50c; ton lots 8.00c. Spot ½-cent higher.

Simanal: (Approx. 20% each silicon, manganese, aluminum) Contract basis, freight allowed, per lb. of alloy; carlots 10.50c; ton lots 11.00c, less ton lots, 11.50c.

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials. As of April 16, 1941

	Hot rolled bars	Structural shapes	Plates	Floor plates	Hot rolled sheets (10 gage base)	Hot rolled bands (12 gage and heavier)	Hot rolled hoops (14 gage and lighter)	Galvanized flat sheets (24 gage base)	Cold rolled sheets (17 gage base)	Cold finished bars	Cold-rolled strip	AISI hot bars 2300 series	AISI hot bars 3100 series
Boston	3.98[1]	3.85[1]	3.85[1]	5.66[1]	3.71[1]	4.06[1]	5.06[1]	5.11[14]	4.68[14]	4.13[21]	3.46	7.75[20]	6.05[20]
New York	3.84[1]	3.75[1]	3.76[1]	5.56[1]	3.58[1]	3.96[1]	3.96[1]	5.00[13]	4.60[1]	4.09[21]	3.51	7.60[20]	5.90[20]
Philadelphia	3.85[1]	3.55[1]	3.55[1]	5.25[1]	3.55[1]	3.95[1]	4.45[1]	4.90[13]	4.63[13]	4.06[21]	3.31	7.56[20]	5.86[20]
Baltimore (city)	3.85[1]	3.70[1]	3.70[1]	5.25[1]	3.50[1]	4.00[1]	4.35[1]	5.05[17]	5.00[13]	4.04[21]	....	....	....
Baltimore (country)	3.85[1]	3.70[1]	3.45[1]	5.25[1]	3.25[1]	4.00[1]	4.35[1]	4.75[17]	5.00[13]	4.04[21]	....	....	....
Washington, D. C.	3.95[1]	3.80[1]	3.80[1]	5.35[1]	3.60[1]	4.10[1]	4.45[1]	5.15[17]	5.10[13]	4.03[21]	....	....	....
Norfolk, Va.	4.00[1]	4.05[1]	4.05[1]	5.45[1]	3.85[1]	4.10[1]	4.10[1]	5.40[17]	4.50[24]	4.15[21]	....	....	....
Bethlehem, Pa.*	3.45[1]	....	....	....	....	....	....	....	....	....	....	....	....
Claymont, Del.*	....	....	3.45[1]	....	....	....	....	....	....	....	....	....	....
Coatesville, Pa.*	....	....	3.45[1]	....	....	....	....	....	....	....	....	....	....
Buffalo (city)	3.35[1]	3.40[1]	3.62[1]	5.25[1]	3.25[1]	3.82[1]	3.82[1]	4.75[13]	4.30[13]	3.75[21]	3.52	7.35[20]	5.65[20]
Buffalo (country)	3.25[1]	3.30[1]	3.62[1]	5.25[1]	3.15[1]	3.82[1]	3.82[1]	4.65[13]	4.20[13]	3.65[21]	....	....	....
Pittsburgh (city)	3.35[1]	3.40[1]	3.40[1]	5.00[1]	3.35[1]	3.60[1]	3.60[1]	4.75[13]	4.00[24]	3.65[21]	....	7.45[20]	5.75[20]
Pittsburgh (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.50[1]	3.50[1]	4.65[13]	4.00[24]	3.65[21]	....	....	....
Cleveland (city)	3.25[1]	3.58[1]	3.40[1]	5.18[1]	3.35[1]	3.50[1]	3.50[1]	4.62[13]	4.05[13]	3.75[21]	3.20	7.55[20]	5.85[20]
Cleveland (country)	3.25[1]	3.58[1]	3.30[1]	5.18[1]	3.25[1]	3.50[1]	3.50[1]	4.62[13]	3.95[13]	3.65[21]	....	....	....
Detroit	3.43[1]	3.65[1]	3.60[1]	5.27[1]	3.43[1]	3.43[1]	3.65[1]	4.84[13]	4.30[13]	3.80[21]	3.40	7.67[20]	5.97[20]
Omaha (city)	4.10[1]	4.15[1]	4.15[1]	5.75[1]	3.85[1]	4.20[1]	4.20[1]	5.52[13]	4.77[24]	4.42[21]	....	....	....
Omaha (country)	4.00[1]	4.05[1]	4.05[1]	5.65[1]	3.75[1]	4.10[1]	4.10[1]	5.52[13]	4.77[24]	4.42[21]	....	....	....
Cincinnati	3.60[1]	3.68[1]	3.65[1]	5.28[1]	3.42[1]	3.67[1]	3.67[1]	4.92[13]	4.37[24]	4.00[21]	3.45	7.69[20]	5.99[20]
Youngstown, O.*	....	....	....	....	....	....	....	4.40[13]	....	....	....	....	....
Middletown, O.*	....	....	....	....	3.25[1]	3.50[1]	3.50[1]	4.40[13]	....	....	....	....	....
Chicago (city)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.25[1]	3.60[1]	3.60[1]	4.85[13]	4.10[24]	3.75[21]	3.50	7.35[20]	5.65[20]
Chicago (country)	3.40[1]	3.45[1]	3.45[1]	5.05[1]	3.15[1]	3.50[1]	3.50[1]	4.75[13]	4.00[24]	3.65[21]	....	....	....
Milwaukee	3.63[1]	3.68[1]	3.68[1]	5.28[1]	3.38[1]	3.73[1]	3.73[1]	4.98[13]	4.23[24]	3.88[21]	3.54	7.33[20]	5.86[20]
St. Paul	3.75[2]	3.80[2]	3.80[2]	5.40[2]	3.50[2]	3.85[2]	3.85[2]	5.00[2]	4.35[2]	4.34[21]	3.83	7.70[20]	6.00[20]
St. Louis	3.64[1]	3.69[1]	3.69[1]	5.29[1]	3.39[1]	3.74[1]	3.74[1]	4.99[13]	4.24[24]	4.02[21]	3.61	7.72[20]	6.02[20]
Indianapolis (city)	3.60[1]	3.70[1]	3.70[1]	5.30[1]	3.45[1]	3.75[1]	3.75[1]	5.01[13]	4.25[24]	3.97[21]	....	....	....
Indianapolis (country)	3.35[1]	3.45[1]	3.40[1]	5.05[1]	3.20[1]	3.50[1]	3.50[1]	5.01[13]	4.00[24]	3.97[21]	....	....	....
Memphis, Tenn.	3.90[2]	3.95[2]	3.95[2]	5.71[2]	3.85[2]	4.10[2]	4.10[2]	5.25[11]	4.66[13]	4.31[21]	....	....	....
Birmingham (city)	3.50[2]	3.55[2]	3.55[2]	5.83[2]	3.45[2]	3.70[2]	3.70[2]	4.75[13]	4.78[24]	4.43[21]	....	....	....
Birmingham (country)	3.40[2]	3.45[2]	3.45[2]	5.83[2]	3.35[2]	3.60[2]	3.60[2]	4.75[13]	4.78[24]	4.43[21]	....	....	....
New Orleans (city)	4.10[4]	3.90[4]	3.90[4]	5.83[4]	3.95[4]	4.20[4]	4.20[4]	5.25[26]	4.95[13]	4.60[21]	5.00	....	....
New Orleans (country)	4.00[4]	3.80[4]	3.80[4]	5.73[4]	3.85[4]	4.10[4]	4.10[4]	5.15[26]	4.95[13]	4.60[21]	....	....	....
Houston, Tex.	3.75[3]	4.25[3]	4.25[3]	5.50[3]	3.75[3]	4.30[3]	4.30[3]	5.25[26]	5.43[13]	4.50[22]	....	....	....
Los Angeles	4.35[4]	4.60[4]	4.90[4]	7.15[4]	4.95[4]	4.90[4]	6.70[4]	5.95[13]	7.15[3]	5.70[23]	....	9.55[20]	8.55[20]
San Francisco (city)	3.95[7]	4.35[7]	4.65[7]	6.35[7]	4.55[7]	4.50[7]	4.50[7]	6.60[13]	7.55[13]	5.55[23]	....	9.80[3]	8.80[3]
San Francisco (country)	3.85[7]	4.25[7]	4.55[7]	6.25[7]	4.45[7]	4.40[7]	4.40[7]	6.50[13]	7.45[13]	5.45[23]	....	....	....
Tacoma	4.20[3]	4.45[3]	4.75[3]	6.50[3]	4.65[3]	4.25[3]	5.45[3]	5.70[3]	6.63[24]	5.75[23]	....	....	....
Seattle (city)	4.20[3]	4.45[3]	4.75[3]	6.50[3]	4.65[3]	4.35[3]	5.45[3]	5.70[3]	6.63[24]	5.75[23]	....	....	8.00[3]

*Basing point cities against which warehouses equalized freight as of April 16, 1941, and which must now be used in calculating lowest combination prices.

NOTE—All prices except cold-rolled strip and AISI hot-rolled bars fixed by Office of Price Administration in amendment No. 10 to Revised Price Schedule No. 49.

BASE QUANTITIES

[1]—400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 3999 pounds; [6]—300 to 1999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds; [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles; [19]—100 to 749 pounds; [20]—300 to 1999 pounds; [21]—1500 to 39,999 pounds; [22]—1500 to 1999 pounds; [23]—1000 to 39,999 pounds; [24]—400 to 1499 pounds; [25]—1000 to 1999 pounds; [26]—under 25 bundles. Cold-rolled strip, any quantity is base.

Ores

Lake Superior Iron Ore
Gross ton, 51½% Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore
Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract	13.00

Foreign Ore
Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	7.50-8.00c

Tungsten Ore

Chinese wolframite, per short ton unit, duty paid	$24.00

Chrome Ore
(Equivalent OPA schedules):
Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Ore., or Tacoma, Wash. ($/5 paying for discharging; dry basis; subject to penalties if guarantees are not met.)

Indian and African	
48% 2.8:1	41.00
48% 3:1	43.50
48% no ratio	31.00
South African (Transvaal)	
44% no ratio	27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80
Brazilian—nominal	
44% 2.5:1 lump	33.65
48% 3:1 lump	43.50
Rhodesian	
45% no ratio	28.30
48% no ratio	31.00
48% 3:1 lump	43.50
Domestic (f.o.b. Columbus, Mont.)	
48% 3:1	43.50

less $7 freight allowance

Manganese Ore
Including war risk but not duty, cents per gross-ton unit, dry, f.o.b. cars, New Orleans and Mobile; 5 cents higher at Norfolk, Baltimore, Philadelphia, New York; adjustments for analysis variations. (Based on OPA schedules.)

Brazilian, 48%	73.8c
Brazilian, 46%	71.8c
Caucasian, 51%	75.3c
Caucasian, 50%	74.8c
Chilean, 48%	73.8c
Indian, 50%	74.8c
Indian, 48%	73.8c
South African, 48%	73.8c
South African, 46%	71.8c
(Duty Free)	
Cuban, 51%	86.8c
Cuban, 48%	85.0c
Cuban, 45%	82.0c
Philippine, 50%	85.0c
Domestic, 48%, f.o.b. mines	96 0c

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

NATIONAL EMERGENCY STEELS (Hot Rolled)

Extras for Alloy Content

Designation	Chemical Composition Limits, Per Cent — Carbon	Mn.	Si.	Cr.	Ni.	Mo.	Basic open-hearth Bars per 100 lb.	Basic open-hearth Billets per G T	Electric furnace Bars per 100 lb.	Electric furnace Billets per G T
NE 1330	.28-.33	1.60-1.90	.20-.35	.....	.....		$ .10	$2.00	....	.....
NE 8020	.18-.23	1.00-1.30	.20-.35	.....	.....	.10-.20	.45	9.00	3.95	$19.00
NE 8442	.40-.45	1.30-1.60	.20-.35	.....	.....	.30-.40	.90	18.00	1.40	28.00
NE 8615	.12-.17	.70- .90	.20-.35	.40-.60	.40-.70	.15-.25	.75	15.00	1.25	25.00
NE 8720	.18-.18	.70- .90	.20-.35	.40-.60	.40-.70	.20-.30	.80	16.00	1.30	26.00
NE 9255	.50-.60	.75-1.00	1.80-2.20	.....	.....	.....	.40	8.00	..	...
NE 9262	.55-.65	.75-1.00	1.80-2.20	.20-.40	.....	.....	.65	13.00	..	...
NE 9415	.13-.18	.80-1.10	.40-.60	.20-.40	.20-.50	.08-.15	.80	16.00	1.30	26.00
NE 9442	.40-.45	1.00-1.30	.40-.60	.20-.40	.20-.50	.08-.15	.85	17.00	1.35	27.00
NE 9587	.35-.40	1.20-1.50	.40-.60	.40-.60	.40-.70	.15-.25	1.20	24.00	1.70	34.00
NE 9630	.28-.33	1.20-1.50	.40-.60	.40-.60	....	....	.80	16.00	1.30	26.00
NE 9642	.40-.45	1.30-1.60	.40-.60	.40-.60	.....	.....	.85	17.00	1.35	27.00

Extras are in addition to a base price of 2.70c. per 100 lb., on finished products and $54 per gross ton on semifinished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semifinished. No prices quoted on vanadium alloy.

MAXIMUM PRICES FIXED BY OPA ON IRON AND STEEL SCRAP

Other than railroad grades quoted on the basis of basing point prices from which shipping point prices and consumers' delivered prices are to be computed. Scrap originating from railroads quoted delivered to consumers' plants located on the line of the railroad from which the material originated. All prices in gross tons. A basing point includes its switching district.

PRICES FOR OTHER THAN RAILROAD SCRAP

					ELECTRIC FURNACE, ACID OPEN-HEARTH AND FOUNDRY GRADES									
					Low Phos. Grades									
	OPEN HEARTH GRADES*	Mixed Bor., Turn., Machine Turnings	Cast Iron Borings	Shoveling Turnings	Billet, Bloom Forge Crops	Bar Crops and smaller; Punchings, Plate	Heavy Structural, Plate 3 ft. and less	2 ft. and less	1 ft. and less	Foundry Steel 2 ft. and less	1 ft. and less	Alloy-Free Low Phos. & Sulphur Turnings	First Cut Heavy Axle & Forge Turnings	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Johnstown, Midland, Monessen, Sharon, Steubenville, Weirton, Canton, Youngstown, Warren	$20.00	$15.00	$16.00	$17.00	$25.00	$22.50	$21.50	$22.00	$22.50	$21.50	$22.00	$18.00	$19.50	$21.00
Claymont, Coatesville, Harrisburg, Conshohocken, Phoenixville	18.75	13.75	14.75	15.75	23.75	21.25	20.25	20.75	21.25	20.25	20.75	16.75	18.25	19.75
Bethlehem	18.25	13.25	14.25	15.25	23.25	20.75	19.75	20.25	20.75	19.75	20.25	16.25	17.75	19.25
Buffalo	19.25	14.25	15.25	16.25	24.25	21.75	20.75	21.25	21.75	20.75	21.25	17.25	18.75	20.25
Cleveland, Middletown, Cincinnati, Portsmouth, Ashland	19.50	14.50	15.50	16.50	24.50	22.00	21.00	21.50	22.00	21.00	21.50	17.50	19.00	20.50
Detroit	17.85	12.85	13.85	14.85	22.85	20.35	19.35	19.85	20.35	19.35	19.85	15.85	17.35	18.85
Toledo	†15.35	12.85	13.85	14.85	....	....	....	....	....	....	....	....	....	....
Chicago	18.75	13.75	14.75	15.75	23.75	21.25	20.25	20.75	21.25	20.25	20.75	16.75	18.25	19.75
Kokomo	18.25	13.25	14.25	15.25	23.25	20.75	19.75	20.25	20.75	19.75	20.25	16.25	17.75	19.25
Duluth	18.00	13.00	14.00	15.00	23.00	20.50	19.50	20.00	20.50	19.50	20.00	16.00	17.50	19.00
St. Louis	17.50	12.50	13.50	14.50	22.50	20.00	19.00	19.50	20.00	19.00	19.50	15.50	17.00	18.50
Birmingham, Atlanta, Alabama City, Los Angeles, San Francisco, Pittsburg, Calif.	17.00	12.00	13.00	14.00	22.00	19.50	18.50	19.00	19.50	18.50	19.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	11.50	12.50	13.50	21.50	19.00	18.00	18.50	19.00	18.00	18.50	14.50	16.00	17.50
Seattle	14.50	9.50	10.50	11.50	19.50	17.00	16.00	16.50	17.00	16.00	16.50	12.50	14.00	15.50

RAILROAD SCRAP

	Heavy Melting Steel	Scrap Rails	Rails for Rolling	Scrap Rails: 3 ft. and under	Scrap Rails: 2 ft. and under	Scrap Rails: 18 in. and under
Pittsburgh, Wheeling, Steubenville, Sharon, Youngstown, Canton	$21.00	$22.00	$23.50	$24.00	$24.25	$24.50
Philadelphia, Wilmington, Sparrows Point	19.75	20.75	22.25	22.75	23.00	23.25
Cleveland, Cincinnati, Middletown, Ashland, Portsmouth	20.50	21.50	23.00	23.50	23.75	24.00
Chicago	19.75	20.75	22.25	22.75	23.00	23.25
Buffalo	20.25	21.25	22.75	23.25	23.50	23.75
Detroit	18.85	19.85	21.35	21.85	22.10	22.35
Kokomo	19.25	20.25	21.75	22.25	22.50	22.75
Duluth	19.00	20.00	21.50	22.00	22.25	22.50
Kansas City, Mo.	17.00	18.00	19.50	20.00	20.25	20.50
St. Louis	18.50	19.50	21.00	21.50	21.75	22.00
Birmingham	18.00	19.00	20.50	21.00	21.25	21.50
Los Angeles, San Francisco	18.00	19.00	20.50	21.00	21.25	21.50
Seattle	15.50	16.50	18.00	18.50	18.75	19.00

CAST IRON SCRAP OTHER THAN RAILROAD

(Shipping point prices in gross tons)

	Group A	Group B	Group C
No. 1 Cupola Cast	$18.00	$19.00	$20.00
No. 1 Machinery Cast, Drop Broken, 150 lbs. & Under	18.00	19.00	20.00
Clean Auto Cast	18.00	19.00	20.00
Stove Plate	17.00	18.00	19.00
Unstripped Motor Blocks	15.50	16.50	17.50
Heavy Breakable Cast	15.50	16.50	17.50
Charging Box Size Cast	17.00	18.00	19.00
Miscellaneous Malleable	20.00	21.00	22.00

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.

Group C includes states not named in groups A and B, plus Kansas City, Kans.-Mo.

*Open Hearth Grades refer to No. 1 heavy melting steel, No. 1 hydraulic compressed black sheet scrap, No. 2 heavy melting steel, dealers' No. 1 bundles, dealers' No. 2 bundles and No. 1 busheling. No. 1 chem. borings, 1 per cent oil, $1 under, No. 2, 1.5 per cent oil, $2 under heavy melting steel. No. 3 bundles, $2 under No. 1 heavy melting; cast steel, $2.50 over, No. 2 busheling, $2.50 under No. 1 heavy melting steel, auto springs, crankshafts, $1 over No. 1 heavy melting. †Toledo open-hearth grades cover only No. 2 busheling.

A basing point includes the switching district of the city named. The Pittsburgh basing point includes the switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport, Pa. Cincinnati basing point includes the switching district of Newport, Ky. St. Louis basing point includes the switching districts of Granite City, East St. Louis and Madison, Ill. San Francisco basing point includes the switching districts of South San Francisco, Niles and Oakland, Calif.

Inferior Grades: Maximum prices of inferior grades shall continue to bear the same differential below the corresponding listed grades as existed from Sept. 1, 1940, to Jan. 31, 1941. No premium allowed on grades considered superior, unless approved by OPA. Addition of special preparation charges prohibited. Purchase of electric furnace or foundry grades for open hearth or blast furnace use permitted only at no more than price for corresponding open hearth grade. Exceptions: Low phos. billet, bloom and forge crops and electric furnace bundles may exceed open hearth price, and electric furnace bundles may exceed blast furnace price, if material is delivered to the consumer direct from the original industrial producer.

Commissions: No commission is payable except by a consumer to a broker for services rendered, the commission not to exceed 50 cents per gross ton. No commission is payable unless: The broker guarantees the quality and delivery of an agreed tonnage the scrap is purchased at a price no higher than the maximum allowed; the broker sells the scrap to the consumer at the same price at which he purchased it; the broker does not split the commission with the seller of the scrap, with another broker or sub-broker, or with the consumer. Commissions must be shown as separate item on invoice.

Maximum Shipping Point Price: Where shipment to consumer is by rail, vessel or combination of both, scrap is at its shipping point when it has been placed f.o.b. railroad car or f.a.s. vessel. In such cases, maximum shipping point prices are: (1) For shipping points located within a basing point, the price listed in the above table for scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point; and (2) for shipping points located outside a basing point, the price in the above table for scrap at the most favorable basing point, minus the lowest transportation charge by rail, water or combination thereof. When vessel movement is involved, dock charges shall be 50 cents at Memphis, $1 at Great Lakes ports, $1.25 at New England ports, 75 cents elsewhere. New England shipping point prices computed on most favorable basing point prices; maximum transportation charge on scrap from New England, $6.65 per ton.

Scrap shipped by motor vehicle is at its shipping point when loaded. For shipping points within basing points, maximum is price listed in table minus lowest switching charge. When outside basing point, maximum is price at most favorable basing point minus lowest established charge when hauled by common carrier. When hauled by seller charges are based on carload rate for rail shipment, minimum $1.00 per ton.

Maximum Delivered Prices: Determined by adding established transportation charges to shipping point price, not to exceed by more than $1 (plus freight rate increase March 18, 1942) the prices listed in the table for the nearest basing point. Certain exceptions specified in Revised Price Schedule No. 4 (Amendment 1) apply to St. Louis district consumers, to WPB allocations, to water shipments from Duluth or Superior, Wis., to shipments of billets, blooms and forge crops from Pittsburgh and to shipments of electric and foundry grades from Michigan; to shipments of turnings to ferroalloy producers and of borings to chemical users. Delivered prices of scrap shipped under WPB allocations may exceed prices at nearest basing point by more than $1, if most economical transportation is used.

Unprepared Scrap: Above prices are for prepared scrap. Maximum prices for unprepared scrap are $3.50 less; (material from which Nos. 1, 2 and 3 bundles made is $4 less) than for the corresponding grades of prepared scrap, except for heavy breakable cast. In no case shall electric furnace and foundry grades be used as the 'corresponding grades of prepared scrap."

Remote Scrap: Consists of all grades, except railroad scrap, in Florida, Montana, Idaho, Wyoming, Nevada, Arizona, New Mexico, Texas, Oklahoma, Oregon, Washington, Louisiana, Utah. Delivered price may exceed by not more than $5 the price at the basing point nearest consumer's plant, provided sworn details furnished OPA. Permission required to exceed by more than $5 the nearest basing point price. Colorado scrap is remote scrap for Colorado consumers only.

Sheets, Strip . . .

Sheet & Strip Prices, Page 140

Sheet demand as reflected by new orders is off somewhat. This is particularly noticeable in cold-rolled. A part of this decline can be attributed no doubt to the situation in tin plate where actual production for first quarter is muddled and tin mills are unable to set up definite schedules for deliveries of cold-rolled sheets during second quarter.

Orders for both hot and cold rolled sheets so far in January show a substantial decline from the average figures per month for fourth quarter. With the advent of the Controlled Materials Plan, war plants will not find it necessary to maintain as large an inventory as in the past, and it is probable that advance buying is reflecting this situation.

In addition, a good many war plans have been completed and immediate war contracts are waiting for further word from the armed forces on new programs. Some programs for the production of war materiel have been slowed down pending further military action. This uncertain state necessarily has its reflection in steel markets.

New buying of narrow cold strip has slackened and while shipments are maintained to directive quota schedules, deliveries on some tonnage destined for small arms munitions are extended, notably cartridge clip steel. Other orders are moved up on production schedules and in some cases fabricators will receive deliveries sooner than expected. Considerable high carbon material is affected, but heat-treating equipment is taxed to capacity. Three new annealing furnaces have been ordered by one New England producer. Deliveries of hot strip to rerollers are geared well to cold material directives. Orders for stainless are light, but considerable stainless is included in frozen and surplus stock lists.

Plates . . .

Plate Prices, Page 141

With applications for steel plates for March delivery due in hands of producers by Feb. 1 and new orders for that month's rolling scheduled to be in 35 days in advance, the past week witnessed a flurry of plate buying, despite efforts of producers to have customers spread orders more evenly over the month.

Most sellers met an increase in tonnage applied for and attribute the gain mainly to shipbuilding needs, particularly in sheared plates. A gain also is reported in demand for universal and strip plates for railroad and some other needs.

Some producers report for the first time the appearance of so-called urgency numbers, which identify certain projects and give precedence over tonnage carrying priority ratings, if such precedence is necessary. First urgency numbers appeared in December and there have been few in all, most appearing within the past ten days. Most steel sellers have not received any. These numbers so far seem to have been identified with synthetic rubber and high-octane gasoline plants, both here and abroad. These numbers are accompanied by information as to completion date of the project and the time orders are to be delivered.

Bars . . .

Bar Prices, Page 140

While slight easing has been noted in delivery of steel bars the change has not been marked and large rounds, as well as billets, are most difficult. On large rounds nothing is available during first quarter except on full directives and little can be promised before the middle of second quarter. Small rounds are promised in five to six weeks against high ratings.

As has been the case for some time, alloy steel deliveries are most extended with practically no gain being made against backlogs.

Pipe . . .

Pipe Prices, Page 141

Merchant pipe production continues substantially below capacity and with virtually the entire output going into war orders, both directly from mills and through jobbers. Stocks of merchant pipe held by jobbers have reached the lowest point in history. There is still a trickle of pipe moving into jobbers' stocks for use on low priority maintenance and repair work.

Oil country tubular goods are dull. The ban on gasoline has cut into drilling operations to such an extent that

DIAMOND G DELIVERS LARGEST ORDER . . . IN SHORTEST TIME!

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Mfrs. of Lock and Flat Washers
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DIAMOND G LOCKWASHERS

there are now virtually no new orders for drill pipe and casing. Producers hold some hope that there will be an increase later this year. It is believed that demands for gasoline and oil from the armed forces, plus what remains of civilian demand, will make necessary some drilling activities later in the year.

War Production Board has announced a parallel pipe line from Texas to Indiana. The line will be 836 miles of 20-inch pipe and will run from Beaumont-Houston refining area to Seymour, Ind. It is expected to cost about $44,000,000 and planned to be completed by Sept. 1. It will carry gasoline and other petroleum products, but will not carry crude oil the announcement states. Secretary Ickes has stated the line will not be for civilian use but will supply only military and lend-lease requirements. It will be built by War Emergency Pipe Lines, Inc. and will follow the same route as the 24-inch line now being completed. It will require an estimated 164,000 tons of steel and pumping equipment capable of generating 55,000 horsepower.

Secretary Ickes has notified WPB that he will report in May a decision as to whether the line should be extended to the eastern seaboard. The possible extension would require an additional 100,000 tons of steel and 50,000 horsepower of pumping capacity.

While stocks of merchant pipe distributors are below normal, they are somewhat better than last fall. This is attributed not only to a somewhat freer movement from mills as a result of changes in warehouse directives, but to a sharp decline in demand for merchant pipe. Building construction has been on the decline for months, due to government limitations on civilian construction and to tapering in war construction. Normally January is a slow month at best, but demand for building work has declined so drastically that the volume is much lower than normal, and there are no indications of appreciable improvement.

While stocks in general are adequate under existing conditions, there is a dearth of some sizes and most resellers believe there is room for a better balancing of stocks before becoming too concerned over the lack of tonnage now moving.

Mill deliveries are easy on smaller sizes, but are well extended on the larger and also on mechanical and boiler tubing.

COKE OVEN EQUIPMENT

QUENCHING CARS AND LOCOMOTIVES

All Atlas Coke Oven Equipment is of heavy-duty construction permitting the peak operating conditions required in today's stepped-up production schedules. As a result of years of experience, Atlas is able to design and build equipment, to meet the requirements of each particular coke plant. Detailed information available on request.

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The ATLAS CAR & MFG. CO.

ENGINEERS MANUFACTURERS

1100 IVANHOE RD. CLEVELAND, OHIO, U. S. A.

Wire . . .

Wire Prices, Page 141

New orders for wire are in excess of shipments, especially for fine wire specialties and alloys, requirements for aircraft mounting steadily. Pressure is on some producers for lend-lease specialties to Russia. While demand for common wire is relatively less heavy than for specialties, schedules are absorbing about all the rod volume available. High carbon round wire departments are at capacity and annealing equipment is engaged to the limit. Slightly easier is barrage cable, but no letdown is noted in rope mill needs. More and more finished wire tonnage is covered by directives, with straight ratings losing some force. This is also applicable to rods, distribution of which are in better balance.

Tin Plate . . .

Tin Plate Prices, Page 141

Tin plate consumers, largely tin can manufacturers, continue to delay placing orders and WPB has authorized some producers to make less than their quotas and to divert the steel to hot-rolled bars and sheets. Lack of orders is unusual at this season, as this usually is a busy time. In spite of various restrictions on use of tin plate for food packing a heavy tonnage will be required for 1943 packs and it is feared later orders will call for more tonnage than can be produced.

Current revisions of earlier estimates of tin plate production indicate a slightly lower rate for the first quarter than had been anticipated. However, tin mills expect the year's average to run about 65 per cent of capacity. Many producers expect the accent on tin plate production to be increased later this year, particularly after electrolytic and bonderizing lines are completed. Some tin plate sellers feel that by the end of 1943 the output of electrolytic plate will be approximately equal to that of dipped plate. Meanwhile, additional delays in equipment and production difficulties in the electrolytic lines have deferred initial operations at several points.

The domestic tin plate program is fairly well outlined. The primary reason for uncertainty on tin plate production is based on the export market inasmuch as substantial quantities of tin plate for export which had already been placed on books have not yet been released and further delays are expected.

Rails, Cars . . .

Track Material Prices, Page 141

Allocations of steel rails for second quarter are expected to be made about the middle of February, requirements division of WPB making its allocations to Office of Defense Transportation about Feb. 1 and the latter dividing the tonnage between the railroads in proportion with their needs. Announcement was made several weeks ago that first quarter rail allocations would be 400,000 tons, with 200,000 tons of steel for accessories. In first quarter last year 538,000 tons of rails were allocated with half that tonnage for accessories. Actual tonnage was about 300,000 tons and if the full allocation is provided this year the carriers will have more rails than a year ago.

Missouri Pacific railway has been authorized by United States district court to expend $8,563,345 during 1943 for equipment and maintenance. Included in the order is permission to buy 30,900 tons of 112-pound steel rails.

Pennsylvania railroad has received WPB permission to build 1000 seventy-ton heavy-duty gondolas in its own shops, to be completed during first half. The cars will have wood planking in the side sections, as a steel conservation measure. Steel posts and braces will hold the planking, which will be replaced by steel after the war, resulting in all-steel construction. Underframes and trucks are of steel. This road already has in service 1500 open-top cars of composite design in which steel will be substituted later. These comprise 500 each of 70-ton gondolas, 50-ton gondolas and 50-ton hoppers.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 141

Two veteran's hospital jobs, each involving 125 tons of concrete bars, with bids in mid-February, constitute about the only construction projects requiring reinforcing material in amounts as high as 100 tons. Outlook is exceedingly dull, except for small plant additions, requirements of which can be met out of bar stocks. All suppliers are in a position to take any jobs offered and competition is keen.

Efforts to move reinforcing bars from group 2 to group 3 of the substitution and supply list of the conservation division of the War Production Board have not yet been successful and are being continued. O. W. Irwin, chairman of the concrete reinforcing bar producers' committee, states in a letter to the conservation division that steel for reinforcing bars is available much beyond present demand. With orders at about 40,000 tons per month sufficient steel is available, he says, to produce 100,000 tons per month. The latter is largely discard billets and rerolling rails.

Meanwhile, he says, plans are being changed to wood or mass concrete construction in the face of lumber shortage and increased concrete use. He claims the request for transfer to group 3 is denied because of the possible effect on the scrap situation by allowing the rejects to be used for bars instead of being remelted for scrap.

Structural Shapes . . .

Structural Shape Prices, Page 141

An increasing portion of restricted structural mill production is going to shipyards; allocations of semifinished for rollings are limited to most urgent needs and tonnage available for fabrication other than ship construction is restricted. Deliveries of plain material to shipyards are heavier, but to other users somewhat more extended. Construction and engineering backlogs with some fabricating shops are gone while most shops will have finished by March 1, except for scattered lots. Fabricators with ship subcontracts, barges, pontoons and miscellaneous work are active in spots, some of this work being of a recurring nature. These contracts are fully engaging welding equipment at some shops, with riveting operations steadily declining in most cases. Diversion of ingots and semifinished from shape mills to other finishing departments is substantial.

Illustrating the extent of the structural steel conservation policy are contracts for a six-section 20,000-ton and

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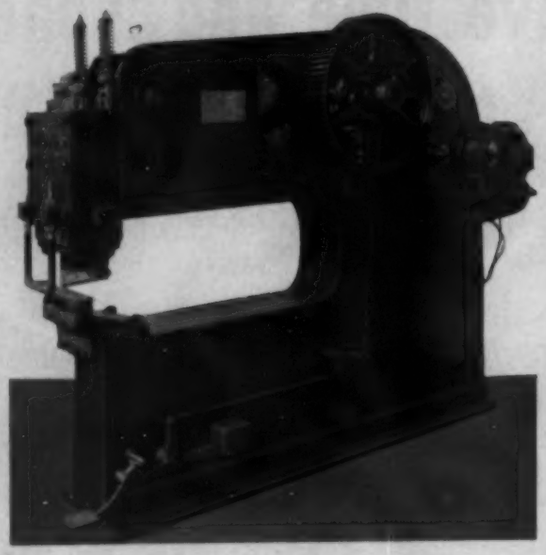
two 1000-ton floating dry docks at a New Jersey point, both to be of timber construction.

Structural shops in the Chicago area are rapidly running out of work, present commitments on general construction work running not much beyond first quarter. Shops which have subcontracts, such as ship work and assemblies, are in a better position. Others are exerting every effort to take on similar work, but with little success. In view of the general situation, fabricators are wondering how they are going to obtain coverage under CMP.

A uniform ceiling price of 2.75 per pound at shipping point on sales to consumers of reusable structural shapes, plates and shafting has been set by OPA in maximum price regulation 310, effective Feb. 1. An extra charge up to ¼-cent per pound is permitted for pieces delivered to length or drilled at request of purchaser.

Bookings of fabricated structural steel in December totaled 67,600 tons, compared with 146,379 tons in the corresponding month in 1941, according to the American Institute of Steel Construction. Total for 1942 was 1,762,453 tons, 3 per cent less than the 2,296,954 tons booked in 1941. December shipments of 145,280 tons compare with 176,126 tons in December, 1941. Total shipments for 1942 were 2,039,966 tons, against 2,251,089 tons for 1941.

Thomas Steel Frame Vertical Punches



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BENDING AND STRAIGHTENING MACHINES • MULTIPLE DRILLS
FABRICATING MACHINERY

Pig Iron . . .

Pig Iron Prices, Page 142

While certain developments are conflicting, the overall picture in pig iron is easier. In some instances melters received cuts in tonnage asked for February from regular sources of supply. It is possible some of these reductions will be offset by allocations from other producers.

On the other hand, various iron foundries see less demand ahead, some have reduced working schedules and others are concerned over the outlook, using up backlogs of orders and see little priority work ahead. It is understood petitions have been made to Washington, singly and in groups, to ease present restrictions on civilian work to provide sufficient business to keep their organizations together. In view of manpower considerations it is understood they received little encouragement.

An eastern merchant seller notes considerable change within the past month or two in pressure for iron, many customers formerly asking prompt delivery now being less insistent.

Two new blast furnace stacks expected to be blown in by Bethlehem Steel Co., one at Bethlehem, Pa., and the other at Lackawanna, N. Y., will not be ready for several weeks on account of delay in receipt of some auxiliary equipment.

Office of Price Administration has established a basing point price of $21.50 per gross ton on basic pig iron at Provo, Utah, which is about to be sold on that base for the first time. This price is 50 cents per ton below that of No. 2 foundry iron, the same relation between grades that exists at most other basic points.

Scrap . . .

Scrap Prices, Page 145

Scrap continues to be provided in sufficient volume for current steel production and considerable reserve exists in yards of dealers, who are hampered in preparing it for market in view of weather and labor conditions.

Increasing rejections of steel turnings are being met, especially in alloys. An instance is a shipment of chrome-nickel material with about 2.5 per cent nickel, rejected because analysis showed 15 points of molybdenum, though it had been purchased on that basis. Residual molybdenum apparently is building up in many alloys.

Supply of turnings is increasing at mills and in scrap yards. Mills use better grades in preference to turnings and borings and resort to the latter in times of shortage. Stored borings and turnings are subject to considerable deterioration from weathering. How much effect may be expected from the recent change in prices by OPA is not yet clear as the new order has not been in effect sufficiently long to demonstrate. Views of scrap dealers are conflicting as to the benefits that may be expected.

Buffalo dealers with facilities for bundling are preparing their accumulations of machine shop turnings and find no difficulty in obtaining acceptance by

melters, though some shipments of loose turnings have been rejected. Industrial salvage drive has uncovered more than 7000 tons of scrap since Dec. 21 and 63,000 tons since the drive started April 1, 1942.

In the first six months of a continuing scrap collection campaign the Buick Motor dealer organization has gathered about 10,000 tons, of which 85 per cent was steel and iron. This included more than 3000 junked cars. Other salvaged materials included 700 tons of rubber and 661,000 pounds of copper, zinc, lead and other nonferrous metals, in addition to these metals salvaged from the dismantled cars.

Chicago has been chosen as the scene of a test drive for collection of scrap copper, brass and bronze, most needed war materials at present, according to William L. McFetridge, WPB salvage director for that area. The campaign probably will cover Feb. 1 to 14 and will enable quotas to be set for metropolitan centers in a nation-wide effort to gather these metals.

Prices on most grades of scrap, shaky for some weeks in New England, are still shaded there for outside shipment on some grades, including stove plate. Readjustments downward in several instances have been made, notably in short steel, of which a surplus exists in that district.

Warehouse . . .

Warehouse Prices, Page 143

Warehouse inventories are improving moderately as a result of mill shipments against higher quotas, and buying has become more orderly. Most hot-rolled products are somewhat more plentiful, but cold-rolled and cold-drawn are extremely scarce. Although stocks are improved from point of tonnage, selection of sizes has not benefited to the same degree. Customers, therefore, still are obliged to take odd sizes in many instances and adapt them to their needs. Supply of NE steels has improved appreciably, the material moving out to consumers almost as fast as it is received, leaving inventories low.

Bolts, Nuts, Rivets . . .

Bolt, Nut, Rivet Prices, Page 141

While the decline in building construction is reflected in bolt and nut buying, manufacturers assert they could handle more tonnage if they could get steel more readily, and if in some cases, they were not having so much difficulty in obtaining adequate manpower. In certain sections, where they have to compete with shipyards for labor, the situation appears particularly difficult.

As for obtaining steel, bolt and nut makers claim that deliveries on small rounds are no more extended than a fortnight or so ago. But on larger rounds, anything from 1¼ inches and up, the situation is even tighter. They assert it is almost impossible to get shipments before late April on these larger sizes. Deliveries on small rounds average five to six weeks.

Some makers say that for certain items, such as rough bolts and those for hot heading, they specify either open-hearth or bessemer steel, but that despite reports that bessemer is in easier supply, they have not found that delivery promises on this type of steel are better than on open hearth. Some believe more bessemer could be used in their lines than is now the case.

Fluorspar . . .

Fluorspar Prices, Page 142

War Production Board announces that five new producers of fluorspar in metallurgical grades will start production this year, adding 60,000 tons annually to the domestic supply. December production was 15 per cent below November output.

Metallurgical Coke . . .

Coke Prices, Page 141

Increase of 50 cents per ton in ceilings on beehive coke is expected to follow probable revision in OPA ceilings on coal prices, contingent on contract negotiations looking to installation of the six-day week throughout the coal mining industry. Thus far the Western Pennsylvania Coal Operators' Association has the only working agreement establishing a six-day week. As this innovation increases costs coal producers have petitioned for higher ceilings. It is understood OPA is willing to make the change but hesitates to do so in only one district in view of the competitive situation.

Rehabilitation of the long idle Leisenring mines and coke ovens of the H. C. Frick Coke Co. in Fayette county, Pennsylvania, is now in progress. Production is expected to get under way early in February. Some of these mines and

An Unusual Advertisement Addressed to Scientists

This is one of America's three largest organizations engaged in conducting research for industrial corporations and governmental agencies. Even with constant expansion it has had to work at peak capacity to meet normal demands. Now, war and post-war development requires additions to a staff of 200 people. Regular sources for new personnel have become inadequate so this means is being used to locate research-minded engineers and scientists who can maintain this organization's high standards. Particularly needed are:

PHYSICS *Physicists with general experience and Physicists with electronic experience.*

ENGINEERING *Mechanical Engineers with a flair for development and Engineers experienced in engineering mechanics.*

METALLURGY *Physicists or Chemists with metallurgical experience and Metallurgists with research experience.*

Such men and women can be assured salary and opportunity commensurate with ability. And, future commitments promise post-war permanency. If you can qualify and are not engaged in essential war work please write immediately.

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coke ovens have been idle for 15 years. Three mines and more than 600 beehive ovens are included in the project. In addition, the Frick company plans to rebuild 300 additional ovens in that vicinity.

OPA today ruled consumers of by-product foundry, blast furnace and beehive furnace coke must pay 4 cents per ton transportation tax of the revenue act, retroactive to Dec. 7. Under the ruling the tax paid on coal used in manufacture of coke, not to exceed 4 cents, may be passed on to the ultimate consumer, but in billing the tax must be stated separately from the price the consumer pays for coke and may not be included in computation of the maximum price.

Steel in Europe . . .

London — (*By Radio*) — Steel allocations in Great Britain have been tightened further, main pressure being on plates and special alloy steels. Demand for structural steel is steady. Tin plate is commanding only moderate sale.

Canada . . .

Toronto, Ont.—Demand for finished and semi-finished steel continued brisk during the past week. While most contracts were for forward delivery and for inventory, spot delivery sales developed more action than for some time and there also was a sharp upturn in business placed with warehouses by consumers in urgent need of small quantities. A number of war plants have completed inventory and most had substantial stocks on hand, but the heavy withdrawals necessary to maintain operations with the two major steel mills closed on account of strikes, has greatly reduced plant holdings in the past couple of weeks.

While actual figures are not available, it is estimated that the closing of the mills will result in an actual loss in steel output for the Canadian war industry of upwards of 150,000 tons and about 75,000 tons of pig iron. While it is not expected this loss will have immediate effect on the war production program, due to the large inventories previous to the strikes, a serious shortage may develop before next spring.

Shipyards continue the principal users of steel plate, and its demand is increasing. Some yards are said to be running short of supplies and difficulty in replenishing stocks is reported. Boiler and tankmakers also have been active buyers recently, and it is reported that many consumers are becoming less particular in specifications, their chief concern being to get delivery as quickly as possible. Heavy withdrawals from warehouse stocks have taken place during the past couple of weeks by users unable to get prompt delivery from mills. While there were possibilities at the beginning of the year of some improvement in the steel controller's allocation of plates, it now appears that any effect of this nature will be delayed for some time.

There has been no easing of pressure on supply of carbon and alloy steel bars and most war consumers report only small stocks on hand. It is stated, however, that increase in production in Canada has made this country almost independent of the United States on special steel bars. Demand for soft steel bars is steady and supply is said to be about equal to demand.

Structural steel lettings continue to drop, with awards for the week at approximately 500 tons. Shutting off of supply of structural steel from Algoma Steel Corp. has reduced available stocks and backlogs are piling up. Most of the shapes now being produced are for shipbuilding.

Inquiries for foundry and malleable pig iron rose sharply during the past week or ten days and a number of melters are short of both pig iron and scrap. Surplus of merchant iron which has been building for several months, has had to be drawn on heavily since the closing of blast furnaces of Algoma Steel Corp., and stocks on hand are said to be sufficient for only two or three weeks. Canadian Furnace Co. is maintaining capacity production, but is able to meet only about 50 per cent of actual needs. The steel controller is allocating pig iron to melters in most urgent need, favoring the more important war producers. Due to shortage of supply, basic iron sales and deliveries have been brought to a standstill.

No improvement is reported in iron and steel scrap receipts by local dealers. Milder weather is enabling war plants and other producers to get out scrap, but no deliveries are reported from the rural districts. Dealers are giving almost full time attention to yard stocks and are again on a normal basis as far as shipments to steel mills are concerned.

How to Keep YOUR Electric Cranes & Hoists

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Nonferrous Metal Prices

Jan.	Copper: Electro, del. Conn.	Copper: Lake, del. Midwest	Copper: Casting, refinery	Straits Tin, New York: Spot	Straits Tin, New York: Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Amer. Spot, N.Y.	Nickel Cathodes
1-28	12.00	12.12½	11.75	52.00	52.00	6.50	6.35	8.25	15.00	14.50	35.00

F.o.b. mill base, cents per lb. except as specified. Copper and brass products based on 12.00c Conn. copper

Sheets

Yellow brass (high)	19.48
Copper, hot rolled	20.87
Lead, cut to jobbers	9.75
Zinc, l.c.l.	13.15

Tubes

High yellow brass	22.23
Seamless copper	21.37

Rods

High yellow brass	15.01
Copper, hot rolled	17.37

Anodes

Copper, untrimmed	18.12

Wire

Yellow brass (high)	19.73

OLD METALS

Dealers' Buying Prices
(In cents per pound, carlots)

Copper

No. 1 heavy	9.25-10.00
Light	7.25- 8.00

Brass

No. 1 composition	8.50- 9.00
Yellow brass castings	5.50- 6.00
Auto radiators	6.12½-6.62½
Red brass, borings & turnings	8.00- 8.50

Zinc

Old	4.75- 5.00
New clippings	6.00- 6.50

Aluminum

Clippings	9.75-10.25
Cast	8.75- 9.25
Pistons	8.50- 8.75
Sheet	8.75- 9.25

Lead

Heavy	4.75- 5.25
Mixed babbitt	5.35- 5.50
Electrotype shells	5.00- 5.50
Stereotype, Linotype	6.00- 6.75

Tin and Alloys

Block tin pipe	44.00-46.00

SECONDARY METALS

Brass ingot, 85-5-5-5, l.c.l.	12.50
Standard No. 12 aluminum	14.50

MAGNESIUM

(12 pound rod, 4 in. diam.)

99.8% ingot, carlots	22.50
100 lb. to carlots	24.50
Extruded sticks, ¼ to 2 lb.	
Carlots	32.00
100 lb. to carlots	34.00
No. 1 pewter	82.00-86.00
Solder joints	7.75- 8.50

Revision of Nonferrous Castings Prices Ordered

Office of Price Administration has ordered a foundry price reduction of 3 cents per pound for aluminum and magnesium and ¼-cent per pound for copper-base castings, in a move to save the government and heavy industries over $25,000,000 in 1943, the reductions effective Feb. 1. An amendment to RMP 125 also exempts from price control foundries doing less than $12,500 worth of business per quarter. It also is provided that current metal prices be used in pricing formulas when pricing castings of a different class. A specific requirement is that foundries must file pricing formulas with OPA.

Semifinished . . .

Semifinished Prices, Page 140

Restrictions on output of some finished steel products is causing shifts in semifinished steel, with consequent easing of tight situations in other lines. An instance is slowness of tin plate consumers in placing orders, which has diverted some semifinished to sheet and bar mills, relieving to some extent the shortage in these products. Reduction in structural steel and reinforcing bar use also is providing increased supply of raw steel for other products, with consequent easing in their deliveries, though the result is not marked.

Iron Ore Ceiling "Threatens Continuing Supply for War"

(*Concluded from Page 53*)

and royalty taxes, personal property and stockpile taxes (as stockpiles in the State of Minnesota are considered as personal property).

"One of these, the ad valorem tax is by far the most formidable. Some way should be found to relieve the burden of ad valorem taxes on marginal and submarginal properties such as underground and other relatively high cost

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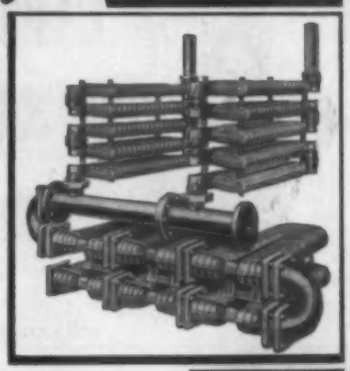
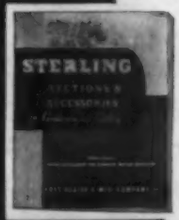


The primary reason for resuming manufacture of STERLING Sections is to fulfill the urgent need for heat exchangers — immediately!

Numerous plants in the petroleum, gas and chemical industries either can't wait for far-off delivery dates of shell and tube heat exchangers, open sections and other types of liquid cooling and condensing equipment, or because of the use of such critical materials as steel, copper and brass, they are unable to get any of this equipment *at all!*



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GENERAL OFFICES AND PLANT—BUFFALO, N. Y.

operations. The occupational and royalty taxes, being a form of income tax, should be kept within reasonable bounds. The personal property tax on stockpiles derived from underground operations should be eliminated altogether.

"If ore prices were to be raised as has been suggested, there might be agitations on the part of cities, villages and school districts on the iron ranges in Minnesota to raise mineral valuations in order to derive greater tax revenues. The various taxing districts and the Department of Taxation should realize that, in order to stimulate production and to stabilize operations on a year-round basis through the opening up of underground mines, no increase in mineral valuations should be asked for or granted.

"Concerns that are using their own ore in their own furnaces are not particularly interested in iron ore prices, as such. Conceivably they might not be in favor of any increase in the price of ore because it would increase their occupational taxes. However, if the price of iron and steel products were to be raised by twice the amount of the raise in iron ore prices (inasmuch as it takes about two tons of ore to make a ton of iron) no particular objection should be in evidence.

"7. No increase in rail and lake freight should be considered necessary. The present rail freight rate of about 1-cent per-ton-mile is exorbitant. Bulk freight such as iron ore, moved in the quantity it is and with the most efficient handling methods, should command a rate of not over ½-cent per ton mile. The independent ore producer finds himself at a decided disadvantage in competition with ores produced from mines owned by companies interested in both mining and transportation. This inequality as well as the exorbitant nature of the freight rates on iron ore have been made the subject of exhaustive hearings before the Interstate Commerce Commission. No relief has ever been given. It is quite possible that lake freight will bear investigation. It naturally follows that if rail and lake freights are subsequently raised or lowered, the ceiling-floor price should vary accordingly.

"8. Under present price conditions there are very few iron mining companies who build up a proper capital reserve with which to acquire or develop new properties. We today are witnessing the gutting and exhaustion of our best reserves of high grade and cheaply minable ore."

RFC Aids in Financing Steep Rock, Ontario, Mine

TORONTO, ONT.

Preliminary work has been started in development of Steep Rock Iron Mines Ltd., in the Atikokan, Ont., district.

Reconstruction Finance Corp. of the United States has advanced $5,000,000 as a 4 per cent loan. In addition to the loan, officials of Steep Rock Iron Mines are asking approval by the Securities Exchange Commission, for sale of $2,225,000 debentures. The debentures will be purchased by a group of bond and brokerage principals in the United States headed by Otis & Co. Bonds will carry 5½ per cent interest. A sinking fund of 15 cents per ton of ore handled will provide for bond retirement. As an inducement to United States and Canadian public, Steep Rock Iron Mines treasury proposes to issue $562,500 shares as a bonus with the bonds. These will be apportioned at the rate of 200 shares bonus for each $1000 bond.

It is estimated that under the new financing arrangement, about 30 per cent control of Steep Rock, will rest with United States interests in one block. In obtaining financial assistance of iron and steel interests in the United States a substantial block of treasury shares will be

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An especially prepared, uniform size, dustless graphite—this product will become one of the most indispensable accessories on the floor. Your own problems may prove no exception—let us examine them now!

THE UNITED STATES GRAPHITE CO.
SAGINAW MICH.

NO. 8 MEXICAN GRAPHITE

WEBB PLATE BENDING ROLLS

ROLLS

Various sizes and capacities
furnished on high priorities.
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You Can Get PROMPT DELIVERIES
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and there is a wide selection of standard sizes available ranging from 8" x 12" to 48" to 120". Smith MASTER Surface Plates have successfully met Aircraft and Ordnance specifications requiring a surface tolerance of one ten-thousands of an inch. Many plants have reordered several times. When your inspection or production departments demand action, you can depend on Smith's enlarged facilities for prompt deliveries. For sizes available and prices, write, wire or phone.

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CUTTING-OFF MACHINES
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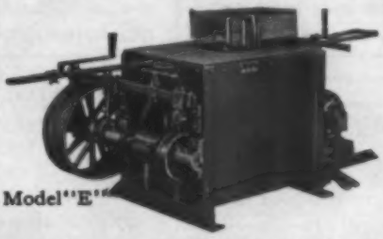
This bender is the result of our 30 years experience in the manufacture of reinforcing bar benders. One man can easily bend 300 four bend stirrups an hour. This bender is also a very practical bender for light slab bars and miscellaneous bending. Write for catalog of our complete line of reinforcing bar benders.



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HIGH SPEED Machines for round wire, flat wire, welding wire, all kinds of wire.

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PATENTED CUTTING-OFF TOOL HOLDERS
PATENTED CUTTING-OFF BLADES

For use on all makes and sizes of
Automatic Screw Machines, Hand Screw Machines, Turret Lathes, and Engine Lathes.

ONLY the PATENTED construction of LUERS cutting-off BLADES permits normal expansion of bursting chips—MEANS MAXIMUM CUTTING EFFICIENCY.

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BY
J. MILTON LUERS
12 Pine Street Mt. Clemens, Mich.

issued. Instead of a bonus issue, which is usually the case in big-scale financing, it is stated 1,437,000 shares will be issued at the nominal or written price of 1 cent per share, to Premier Ore Co., of Cleveland.

A contract has been entered into with the Premier company for the disposal of the Steep Rock iron ore, on a basis of 2 per cent charge, after all expenses for selling.

Cyrus S. Eaton is said to be taking one of the three trustee voting positions on the board of the Canadian company. The Premier company has agreed to deposit 800,000 of the shares secured at 1-cent a share in trust. In case the money to be raised under the present financing plan is not sufficient, the Premier group agrees to lend up to $1,000,000 to Steep Rock on short term notes.

Pentagon Building

(*Concluded from Page 66*)

terrace looking across the lagoon and the Potomac to the Capitol extends a garden terraced in three levels. Each is designed to provide an approach from lower elevations and a setting of dignity for the building as viewed from important highways passing near the 400-acre site.

The heating and cooling equipment is housed in a separate boiler-refrigeration plant. This contains five steam boilers with a capacity of 80,000 pounds of steam per hour at a pressure of 125 pounds. These are coal fired with multiple underfeed stokers, and mechanical dust precipitators are provided. In general, steam is used directly for temperature control at the conditioning apparatus and forced circulation hot water for window units and small booster heaters.

The refrigeration of the water for drying and cooling the air is obtained by twelve 1120-ton centrifugal refrigeration units, which recirculate approximately 24,000 gallons of water per minute through two 36-inch lines. The water is obtained from the Potomac through five vertical well-type pumps of 10,000-gallon capacity each. In 80 spray and coil type dehumidifiers, the chilled water cools more than four million cubic feet of air per minute to 55 degrees Fahr. Approximately 570 fans handle 4,500,000 cubic feet per minute of supply air plus ventilation systems for a total volume of 10,580,000 cubic feet of air per minute.

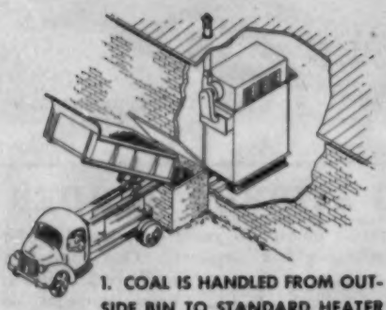
Electrical power is obtained from the local utility, and is transmitted at 66,000 volts to two 33,000 KVA tap changing under land transformers located near the boiler-refrigeration plant. There are 16 transformer vaults, 2000 KVA capacity each, within the Pentagon building and each vault consists of four transformers distributing on a radial feed system with provisions for paralleling fuses in the event of transformer failure. Secondary distribution is three-phase, 4-wire, 125-216-volt. Part of this current is used in some 60,000 ceiling lights.

System Is Flexible

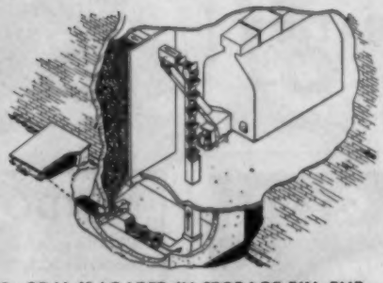
Extreme flexibility features the air-conditioning system, so that partitioning is possible without change on the perimeter system, as a unit is placed at practically every window. Due to the large areas supplied by a signal system, there is less flexibility in the interior systems, but this is partly counterbalanced by compensating factors in air design. There are two principal types of space: perimeter space having windows on approximately 10-foot centers, and interior space where the distance from the window exceeds 25 feet.

Problem of conditioning adjacent to the windows, is basically solved by the use of window induction units in which an amount of air equivalent to that required for cooling in peak summer weather is introduced thru a jet. This jet in turn induces a flow of air from the room thru a steel finned heater within the unit. Resulting mixture is discharged through a grille in the top of the unit. Induction unit forms the entire sill and stool.

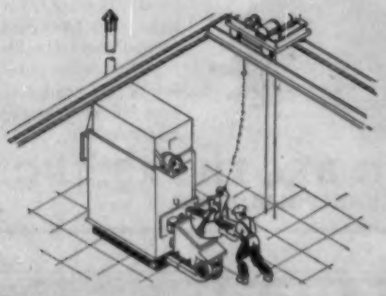
...how to use **Economical direct fired Heating** when coal is the available fuel



1. COAL IS HANDLED FROM OUTSIDE BIN TO STANDARD HEATER



2. COAL IS LOADED IN STORAGE BIN, EMPTIED AUTOMATICALLY TO STOKER HOPPER



3. HANDLING COAL IN CLAMSHELL BUCKET FROM SHOP CRANE TO STOKER HEATER

HEATING industrial plants by means of direct fired warm air heaters fueled with gas or oil has long been an accepted, economical practice. Now Dravo coal fired models also are available for automatic bin, hopper or conveyor feed; hard or soft coal; output 1,000,000 to 8,000,000 B.t.u. per hour. The accompanying drawings show three convenient methods for feeding coal to the stoker.

1. Bin feed stoker, with adequate storage bin constructed outside building wall, accessible to coal truck.
2. Interior storage bin, loaded from outside of building, with bucket conveyor and gravity feed to hopper type stoker (for large capacity units).
3. Regular shop crane and clamshell bucket used to load standard hopper feed model.

Those considering new buildings to be heated with coal, or conversion to coal heat of existing structures, are welcome to copies of Dravo booklets 505 and 506.

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FUSE MARKING
with Matthews No. 201 Machine

All required data is marked on fuse bodies, fuse parts, or other round pieces with this fast production machine. Practically all sizes and models of fuses can be marked.

The insert, above, shows a close-up of how fuse parts are marked. Parts are carried around on the pressure dial table and are quickly and legibly marked when rotated between dial and steel type holder. Write for literature.

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NEW BUSINESS

Plant Expansion, Construction and Enterprise, Government Inquiries, Sub-Contract Opportunities, Contracts Placed and Pending

SUB-CONTRACT OPPORTUNITIES

Data on subcontract work are issued by regional offices of the War Production Board. Contact either the office issuing the data or your nearest field office. Write, don't telephone, and mention key letters and numbers appearing before each item to assure prompt attention and avoid delay.

Chicago office, Contract Distribution Branch of WPB, 226 West Jackson boulevard, is seeking contractors for the following:

American Generator & Armature Co., 2614 West 48th street, Chicago, attention S. Resnick. Job covers machining of pins. Contractor will assist in obtaining material, which is tool steel. Quantity, 6000. Dimensions, ⅛ x ¼-inch. Equipment, bench lathe, 7 x 15-inch turret; grinder, external centerless No. 2. Tolerance, .010. Priority, AA-1. Same prime also requires 5000 stator yokes ground from Globiron hot drawn tubing 3⅞-inch O.D. and 3⅛-inch I.D. Contractor to supply material, subcontractor to make fixture for drilling and countersinking. Dimensions, 2½ x 3½ inches. Equipment, 6 x 18-inch plain cylinder external grinder, 8 x 8¾-inch str. plain internal grinder, two-spindle bench drill ½-inch drill capacity. Quantity, 5000.

Arnold Schwinn & Co., 1718 Kildare avenue, Chicago, attention W. F. Stoeffhaas. Machining of grid, production requirements 1500 to 3000 per month. Contractor furnishes malleable castings. Priority AA-1. Quantity, 15,000. Size 1 x 2 inches. Equipment, turret lathe with one-inch bar capacity. Tolerance, .010.

Automatic Transportation Co., 101 West 87th street, Chicago. Attention J. J. Elliott. Three items required on AA-1 priority. Front axle support, turntable and upper disc. Quantity, 300 of each, as soon as possible. Contractor will furnish forming tools and gages for the 45-degree races. Axle support is 5 x 11 inches, turntable is 7 x 11 inches and disc is 14 x 16 inches. Material cast steel. Equipment, turret lathes 2½ and 4½-inch bar capacity; No. 4 plain horizontal milling machines and vertical No. 2; No.3 Morse eight-spindle drilling machine; No. 2 Morse two-spindle sensitive drill; acetylene cutting; portable grinder; radial drill, 36-inch arm.

Cullman Wheel Co., 1344 Altgeld street, Chicago, attention M. G. Clark. Contractor desires facilities for reducing thickness of 1/16-inch steel discs, 12 inches in diameter, to ⅛-inch thick. Only flat dies will be required, in 3000-pound steam hammer. Quantity, 3000. Contractor will supply material, which is alloy steel.

Fruehauf Trailer Co., Detroit, attention E. D. McGee. Slack adjuster worm. Priority AA-1. Requirements, 10,000 pieces, 200 to 400 per day or better, continuous during 1943. Contractor supplies material from stock. Dimensions, 1 x 3¼ inches. Material, alloy steel. Facilities, four-spindle automatic screw machine, 1-inch capacity; plain No. 1 horizontal milling machine; 1/16-inch drilling capacity two-spindle bench drill; 6 x 12-inch disc cutter; thread mill, zinc plating. Tolerance, .002.

Fyr-Fyter Co., Dayton, O., attention R. C. Iddings. Machining and threading of steel collars, for which contractor supplies steel tubing, priority AA-1. Requirements, 20,000, at 400 to 1000 per day. Contractor may be able to assist in obtaining die heads for cutting threads, which are 10 threads to inch U.S.F. pitch diameter, 3.679-3.685. Prefers subcontractor with own die heads. Facilities, single spindle automatic screw machine 4½-inch capacity, turret lathe 4½-inch bar capacity. Tolerance, .003.

Hall Mfg. Co., Toledo, O., attention R. S. Beverlin. Priority, AA-1. Quantity, 5000. Job consists in drilling hole full length of cold-rolled steel blank, approximately ⅛ and 5/16-inch diameter and length 6½ to 9½ inches. Hole can be drilled from either or both ends. Contractor will furnish blanks in quantities from 3000 to 5000, cut to length. Facilities required, horizontal drilling machine, two-spindle opposed.

Pettibone Mulliken Co., 4710 West Division street, Chicago, attention O. J. Tracy. Priority AA-1. Quantity 2500 to 4000 at rate of 25 per cent per month. Material, cold-rolled steel. Size, 2 x 7 inches. Equipment, 2½-inch bar capacity turret lathe. Tolerance, .001. Contractor supplies material.

Stewart-Warner Corp., 1828 Diversey Parkway, Chicago, attention J. R. Brandenburg. Priority, AA-1. Angle body and foot valve disc. Contractor will assist in furnishing material and special tools. Quantity, 5000 of first item and 300 of second. Material, cold-rolled steel. Facilities, 1-inch capacity single-spindle automatic screw machine and 1⅝-inch bar capacity turret lathe. Tolerance, .003.

Van Brunt Mfg. Co., Horicon, Wis., attention J. L. Deffenbaugh. Priority, AA-1. Grease retainer ring. Production requirements 1200 per month. Subcontractor to do entire job, including furnishing material. Quantity, 8000. Material, cold-rolled steel. Equipment, 6¼-inch bar capacity turret lathe. Tolerance, .010.

Detroit office, Contract Distribution Branch, Production Division, WPB, Boulevard building, is seeking contractors for the following:

Job No. 4323: Bracket. Steel. Quantity, 2000 pieces or more. Facilities, punch press, cadmium plate. Tolerance, plus or minus .0025.

Job No. 4333: Locknut. Brass. Quantity 2000 pieces or more. Facilities, punch press, sensitive drill, broach. Tolerance, plus or minus .002.

Job No. 4345: Retaining nut. Steel forging. Quantity, 2000 pieces or more. Facilities, turret lathe, lathe, gear shaper, internal thread grinder, heat treat, copper plate, cadmium plate. Tolerance, plus or minus .001.

Job No. 4375: Spacer pin. Steel. Quantity, 2000 pieces or more. Facilities, screw machine, centerless grinder. Tolerance, plus .000, minus .0005.

Job No. 4377: Collar. Steel. Quantity, 2000 pieces or more. Facilities, screw machine, sensitive drill, hone. Tolerance, plus .001, minus .000.

Job No. 4386: Collar. Brass. Quantity 2000 pieces or more. Facilities, ⅝-inch screw machine, sensitive drill. Tolerance, plus .002, minus .005.

Job No. 4390: Collar. Steel. Quantity, 2000 pieces or more. Facilities, screw machine, 1 1/16 x ⅛-inch. Tolerance, plus .000, minus .005.

Job No. 4391: Bushing. Steel. Quantity, 2000 pieces or more. Facilities, 1¼-inch screw machine, external thread grinder. Tolerance, plus or minus .0012.

Job No. 4395: Drive shaft. Steel. Quantity, 2000 pieces or more. Facilities, ⅝-inch screw machine, broach, hobber, external grinder. Tolerance, plus .000, minus .0005.

Job No. 4396: Retaining nut. Steel. Quantity, 2000 pieces or more. Facilities, screw machine, tapper, horizontal mill, external grinder, heat treat. Tolerance, plus .000, minus .002.

Minneapolis office, Contract Distribution Branch of WPB, 334 Midland Bank building, is seeking contractors for the following:

S.O. No. 322: Part, welding pads. Facilities, screw machines. Operations, standard screw threads ¼-inch x 20, 5/16-inch x 18, ⅜-inch x 16. Quantity, 50,000 to 200,000. Deliveries, start at once. Material, furnished, X1112, X1113, C1112, B1112, B1113, ⅜-inch standard thickness. Prices, estimated at ⅝-inch, $9.50 to $10 per thousand; ¾-inch $11.40; 1-inch, $12. Drawings from prime contractor.

S.O. No. 323: Miscellaneous parts. Facilities, automatic screw machines, single or multiple, up to one-inch. Quantities, large. Deliveries, start at once. Drawings, prime will supply.

S.O. No. 317: Large number of parts, 1/16 to 1¼-inch. Facilities, small turret lathes with and without hex collets and small automatic or hand screw machines. Quantities, 7000 to 8000 of each item. Material, steel or brass, furnished by prime. Deliveries to start at once. Prices, open. Drawings at Minneapolis office.

Philadelphia Office, Contract Distribution Branch, Production Division, WPB, Broad Street Station building, reports the following subcontract opportunities:

Keefer-2-1: Pennsylvania manufacturer requires subcontracting facilities to produce 750 to 1000 pieces daily of a cartridge container. Equipment required, multiple-spindle automatic screw machines. Material, cold-rolled steel, WD1113, cadmium plated. Dimensions, length 2⅞ inches, O.D. 1.215-inch. Tolerance, plus or minus .004. Internal and external threading. Prints at Philadelphia office.

Keefer-2-2: Pennsylvania manufacturer requires subcontracting facilities to produce 200,000 heads monthly, production to start in February. Equipment required, multiple-spindle screw machines. Material, steel, WD1020 or WDX112. Dimensions, length 1 inch, O.D. .615-inch. Tolerance, plus .001, minus .002. External threading. Prints at Philadelphia office.

New York office, Contract Distribution Branch of WPB, 122 East Forty-Second street, New York, reports the following subcontract opportunities:

S-3-8530: Long Island concern seeks subcontracting facilities on a jewel bearing of brass, diameter .156-inch, 1/32-inch long. Material

BEALL KANT-LINK SPRING WASHERS

KEEP BOLTED ASSEMBLIES *permanently* TIGHT

BEALL Spring Washers compensate for wear, bolt-stretch, corrosion and break-down of finish. They meet rigid Army, Navy and Air Corps specifications. Available in Carbon Steel, Stainless Steel, Phosphor Bronze, Everdur and Monel Metal. Finished in Cadmium Plate, Galvanized, Silver and Parkerized. IMMEDIATE SHIPMENT of all standard sizes.

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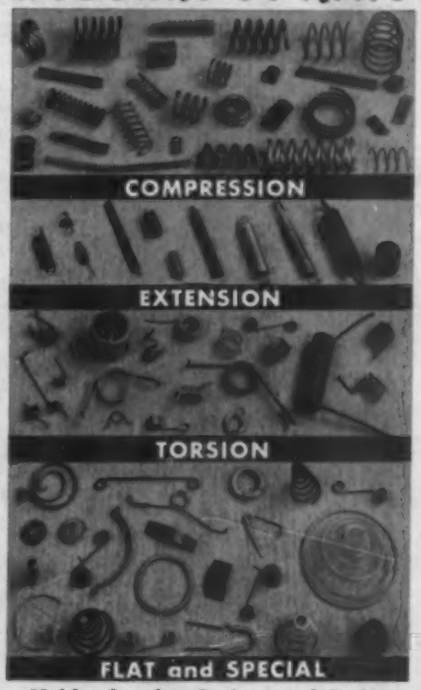

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Torsion spring with one offset hook end and one straight end

Torsion spring with special hook end.

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ALSO—SMALL STAMPINGS AND WIRE FORMS

M. D. HUBBARD SPRING CO.
702 Central Ave., Pontiac, Mich.

supplied by prime contractor. O.D. must be held concentric to I.D. Watchmaker's precision lathe required. Quantity, 30,000 per month.

S-3-8823: Buffalo prime contractor seeks subcontracting facilities on ⅝-inch automatic screw machines. Require 75,000 per month for duration. Material, phosphorus bronze, to be furnished by prime contractor. 98 minimum Rockwell No. 3 test. 1/16-inch cut at completion. Also automatic screw machine facilities, ⅝-inch capacity for 9/16-inch hex. Material, 1015 steel, furnished. Cadmium plate finished all over except hex. Quantity, 3000 each month for duration. 1¼-inch capacity 3.16 x 2⅛-inch mill cutter on horizontal milling machine. Material, No. 132 Dural, furnished. Quantity, 5000 per month. One-inch capacity, $\frac{1}{32}$-inch cut at completion. Phosphorus bronze material, furnished. Requires 98 minimum Rockwell B. Quantity, 75,000 per month. 1¼-inch capacity 1-inch hex. Cadmium plate. Material 6150 H.T. bar stock, furnished. Quantity, 5000 per month. ⅝-inch hex surface treatment. SAE 6150, furnished. 75,000 per month. One-inch hex. Cadmium plate. AMS steel. Quantity, 5000 per month. All for aircraft. Tolerances are close and inspection exact. All parts must be finished all over except hex and must be smooth and uniform. Prints furnished on request.

STRUCTURAL SHAPES . . .

SHAPE CONTRACTS PLACED

1677 tons, synthetic rubber plants, Lake Charles, La., to Mosher Steel Co., Houston, Tex.

1298 tons, synthetic rubber plant, Baytown, Tex., to Mosher Steel Co., Houston, Tex.

1204 tons, butadiene plant, Houston, Tex., to Mosher Steel Co., Houston, Tex.

700 tons, building for Rheem Mfg. Co., Providence, R. I., to Belmont Iron Works, Philadelphia.

100 tons or more, two 100-ton floating cranes, British Admiralty delegation, to Dravo Corp., Pittsburgh, $691,200, bureau of yards and docks contract, Spec. 10983; also ten 30-ton locomotive cranes, various locations, to Ohio Locomotive Crane Co., Bucyrus, O., $278,301.50, spec. 10982.

SHAPE CONTRACTS PENDING

120 tons, shapes and plates for repairs to Pennsylvania railroad bridge in Ohio.

REINFORCING BARS . . .

REINFORCING STEEL PENDING

125 tons, new building and connecting corridors, U. S. Veterans' hospital, Marion, Ind.; bids postponed to Feb. 16.

125 tons, addition, U. S. Veterans' hospital, St. Cloud, Minn.; bids Feb. 23.

PLATES . . .

PLATE CONTRACTS PENDING

250 tons, for large diameter pipe, principally 30 to 42 inches, for Atlantic Refining Co., for work in eastern Pennsylvania and Texas.

RAILS, CARS . . .

CAR ORDERS PLACED

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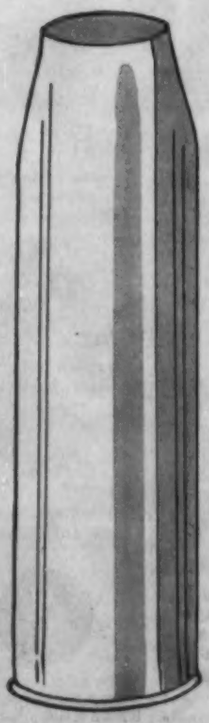

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goes to the root of your cleaning problems quickly, economically, efficiently.

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CONSTRUCTION AND ENTERPRISE

MICHIGAN

ALPENA, MICH.—Die Tool Engineering Co., McKinley avenue, has been incorporated with $100,000 capital to engage in general manufacturing and engineering business. Correspondent, Frank W. Donovan, 2446 Penobscot, Detroit.

GRAND RAPIDS, MICH. — Irwin-Pedersen Arms Co., 1520 Division street, is remodeling plant. Estimated cost $81,000.

DETROIT—Kelsey-Hayes Wheel Co., 3600 Military street, has let contract for plant addition to J. A. Krausmann & Co., 1460 East Jefferson avenue. Cost estimated at $50,000.

DETROIT—Parker Wolverine Co. has awarded contract for alterations to factory at 3641 Milwaukee street, to P. H. Piper, 600 Michigan building.

DETROIT—Ray Dav Piston Corp., 6656 Walton, has rejected all bids for aluminum foundry alterations, and may build complete new plant. Giffels & Vallet, architects.

PONTIAC, MICH.—H. E. Beyster Corp., Detroit architect, has completed plans for additions and alterations to factory building of Die-Typing Corp. here. Bids are being taken.

SAGINAW, MICH.—Severance Tool Industries Inc. has been organized to engage in general manufacturing, by Rollin M. Severance, 3418 Sheridan road, Saginaw.

CONNECTICUT

GLENBROOK, CONN.—Laminated Shim Co. Inc., C. N. Aborn, president, Union street, has let contract for one-story factory additions to Vuono Construction Co., 217 Bedford street, Stamford, Conn. L. F. Caproni, 1221 Chapel street, New Haven, Conn., engineer and architect.

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RE-SET-ABLE
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Micrometer Accuracy
Because: Wing key heat dissipation and absolute diamond lock nib.

• Three grades of diamonds. Common quality $12 per karat. Medium quality $24 per karat. Select quality $48 per karat. (Contour template diamonds supplied only in Medium and Select quality.) • All diamond sizes ¼ to 10 karat are nib mounted for immediate shipment . . . Billed subject to approval. Specify quality of diamond wanted. We recommend a minimum size of one karat for each 6" diameter of grinding wheel. (24 hour resetting service, $1.00 post paid.) Grinders instruction card free. *Send specifications and prints for prices on turning and boring form tools.*

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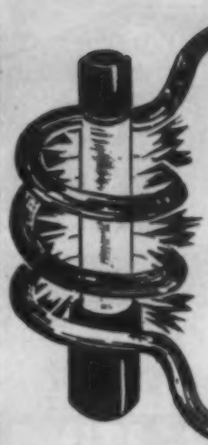

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NEW YORK

LITTLE VALLEY, N. Y.—Borden Co., A. P. Brant, manager, will take bids soon for one-story processing and packing plant addition. Estimated cost $40,000.

NEW JERSEY

HOBOKEN, N. J.—Bertoldi Kelter Co. Inc., Thirteenth and Adams streets, has let contract for one-story foundry to Jacob Kaskam, 1313 Hudson street. Estimated cost $40,000. Charles Diefenbach, 84 Washington street, architect.

JERSEY CITY, N. J.—Vimalert Co., 807 Garfield avenue, has given contract to B. J. Lucarilli & Co. Inc., 22 Orchard street, for plant addition, costing over $40,000. William Newmann & Sons, 587 Summit avenue, architects.

JERSEY CITY, N. J.—Metro Glass Bottle Co., 135 West Side avenue, plans two-story bottling factory. Cost $40,000.

LYNDHURST, N. J.—Aerial Precision Instrument Co., 275 Warren street, plans one-story plant addition. Thomas J. Camlet, 667 Main avenue, Passaic, N. J., architect.

OHIO

AKRON, O.—Atlantic Foundry Co., Charles Reyman, president, 182 North Beaver street, plans $14,000 addition to foundry.

CUYAHOGA FALLS, O.—Emery Machine Co., 1738 Front street, has purchased the Crock building at 1854 Front street, and will use space to expand manufacture of parts on a war material subcontract.

PAINESVILLE, O.—Clifton Products Co., Blackbrook road, will soon start erection of addition to plant here.

PENNSYLVANIA

ALLENTOWN, PA.—Mack International Motor Truck Co., 2647 East York street, has given contract for plant addition to James Stewart & Co., 230 Park avenue, New York. Cost over $40,000.

CHARLEROI, PA.—Keystone Drum Co., Oliver building, Pittsburgh, has let contract for altering former Charleroi Steel Foundry Co. plant to Siesel Construction Co., Chalfonte avenue, Pittsburgh. Estimated cost $40,000.

PHILADELPHIA—Publicker Alcohol Co., 1439 Walnut street, has plans by Silverman & Levy, Architects building, for pilot plant, also granary, at Delaware avenue and Bigler street.

PITTSBURGH—Revised plans have been completed for additional facilities at manufacturing plant on Neville Island here to cost between $100,000 and $300,000. Owner, Defense Plant Corp., 811 Vermont avenue, Washington. Lessee and operator, Vulcan Detinning Co., E. S. Dewey, superintendent, Neville Island, Pittsburgh. New bids are being taken on subcontracts. H. K. Ferguson Co., Hanna building, Cleveland, general contractor.

ILLINOIS

ROCK ISLAND, ILL.—J. I. Case Co., Racine, Wis., has given contract to Austin Co., 310 North Dearborn street, Chicago, for alterations to Rock Island factory buildings to cost about $200,000.

MISSOURI

ST. LOUIS—Millner Co., 3110 North Eleventh street, has acquired factory building at 1308-10 North Sixteenth street, and will make alterations.

WISCONSIN

BEAVER DAM, WIS.—Kirsh Foundry Inc. plans to remodel foundry. Arthur Kuenzi, Watertown, Wis., is engineer.

GREEN BAY, WIS.—Green Bay Box Co. has given contract to Selmer Co. for one-story factory addition.

MILWAUKEE—Badger Brass & Aluminum Co., 5120 West State street, has awarded contracts for one-story factory addition.

WEST ALLIS, WIS.—Le Roi Co. has given contract to Peters Construction Co. for one-story addition.

MINNESOTA

MINNEAPOLIS—Parten Machinery Co. has begun erection of two-story factory addition.

MINNEAPOLIS—Crown Iron Works Co., E. L. Anderson, president, has given contract to E. M. Ganley Co. Inc. for two-story machine shop addition.

MINNEAPOLIS—Diamond Iron Works Inc., L. J. Reay, president, has been authorized by Defense Plant Corp. to undertake a $200,000 plant expansion program.

ST. PAUL—Lametti Equipment Co., 612 Drake street, has been incorporated by Peter and Geremia Lametti to deal in construction and industrial machinery and equipment.

ST. PAUL—Walter Erickson Machine Co., 72 West Fillmore street, has started construction of two-story machine shop addition.

TEXAS

BIG SPRING, TEX.—City commission has authorized sewage disposal plant costing approximately $100,000. G. W. Parkhill, Lubbock, Tex., engineer.

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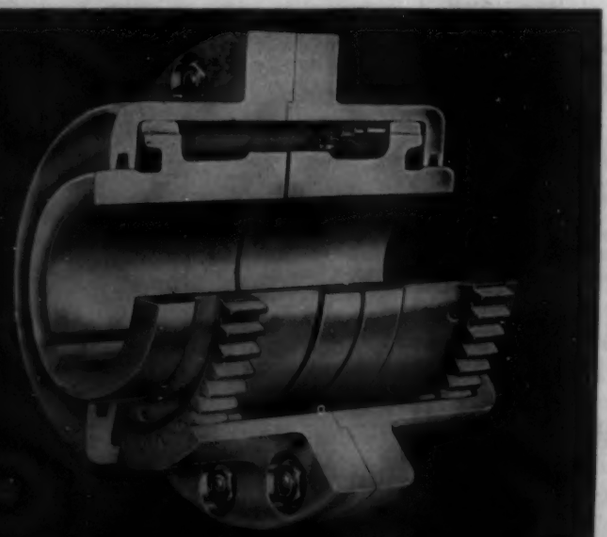

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LOCKNEY, TEX.—Denver Alfalfa Milling & Products Co., Lamar, Colo., and Plainview, Tex., plans alfalfa milling and processing plant here, including dehydration unit. Cost estimated at $80,000.

KANSAS

COFFEYVILLE, KANS.—Defense Plant Corp. will soon start erection of refining plant in Montgomery county to cost in excess of $3,000,000, which will be operated by National Refining Co.

SOUTH DAKOTA

SIOUX FALLS, S. DAK.—Great Northern Railway Co., St. Paul, Minn., plans erection of a roundhouse in southeastern part of the city.

TINTON, S. DAK.—Black Hills Tin Co. plans immediate rebuilding of tin mill destroyed by fire recently. A power plant adjoining the mill was also destroyed. Earl Schultz is general manager.

IOWA

MUSCATINE, IOWA—Grain Processing Corp. will erect and operate an alcohol plant to cost about $1,000,000.

WYOMING

LUSK, WYO.—Continental Oil Co., Lusk, is constructing and equipping butane gas plant at estimated cost of $500,000. Contract has been given to Stearns-Roger Mfg. Co., 1720 California street, Denver.

CALIFORNIA

BERKELEY, CALIF.—Pacific Steel Casting Co., 1316 Second street, has awarded contract to Christensen & Lyons, 3454 Harlan street, Oakland, Calif., for remodeling foundry and office building. A. J. Froberg, 3454 Harlan street, Oakland, architect.

FRESNO, CALIF. — Standard Sheet Metal Works, 702 R street, will build plant addition.

LOS ANGELES—Plans are being prepared for a steel tube mill for Defense Plant Corp., to be operated by Pacific Tube Co. Estimated cost is $1,500,000. Paul E. Jeffers, 816 West Fifth street, Los Angeles, engineer, is preparing plans.

SANTA MONICA, CALIF.—Contract has been let for P.B.T. and punch press building, unit 31, at 2630 Ocean Park boulevard, for Douglas Aircraft Corp.

OREGON

BANDON, OREG.—A primary chrome reduction plant will be built north of here by Humphreys Gold Co., Denver, at estimated cost of $300,000.

PORTLAND, OREG.—Additional plant facilities for Columbia Steel Castings Co., Portland, will be erected as a Defense Plant Corp. project, at cost of $700,000.

CANADA

FALCONBRIDGE, ONT.—Falconbridge Nickel Mines Ltd., 25 King street West, Toronto, plans to start work immediately on plant addition to cost about $25,000.

HAMILTON, ONT.—Canadian Westinghouse Co. Ltd., 288 Sanford avenue North, has plans and will let contracts soon for further plant addition, to cost about $30,000, with equipment.

PRESTON, ONT.—Clare Bros. & Co. Ltd., 223 King street, has begun preliminary work on machine shop to cost about $10,000. Ray M. Hall, 9 Cathy street, Galt, is architect.

SAULT STE. MARIE, ONT.—Algoma Steel Corp. Ltd., Wilde avenue, is having plans prepared by Thomas Wilkes, 13 Bellevue avenue, and bids will be called soon for further plant addition to cost about $60,000.

TORONTO, ONT.—Prest-O-Lite Storage Battery Co. Ltd., 1352 Dufferin street, is considering plans for plant addition, estimated to cost about $50,000, with equipment.

WINDSOR, ONT.—Ford Motor Co. of Canada Ltd., Sandwich street East, is receiving bids for further plant addition to cost $63,000.

CHANDLER, QUE.—Gespesia Sulphite Co. Ltd. is having plans prepared for plant addition and alterations, to cost about $55,000, with equipment.

JOLIETTE, QUE.—Joliette Steel Ltd., 620 Cathcart street, Montreal, is considering plans for further plant addition, estimated to cost about $25,000.

LACHINE, QUE.—Harrington Tool & Die Co. Ltd., 201 First avenue, is having plans prepared for plant addition to cost about $50,000, with equipment. Brian R. Perry, 680 Sherbrooke street West, Montreal, engineer.

MONTREAL, QUE.—Wall Chemicals Canadian Corp. Ltd., 2075 Cabot street, R. C. Holbrook, president, has given general contract to Davidson-Grant Construction Co., 630 Dorchester street, for plant addition at 230 St. Patrick street, Ville LaSalle, to cost about $20,000, equipment extra.

MONTREAL, QUE.—Canadian Car & Foundry Co. Ltd., 621 Craig street West, has plans for plant addition at Mont St. Laurent, Cartierville, to cost about $140,000.

VANCOUVER, B. C.—British Columbia Telephone Co., 768 Seymour street, will start work early next month on erection of power plant addition to cost $230,000, with equipment.

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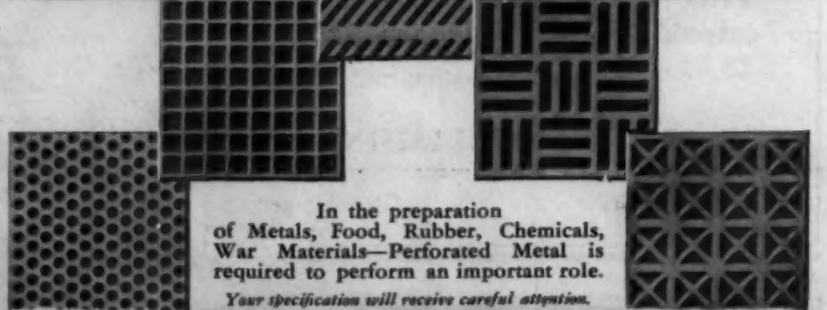

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ADVERTISING INDEX

*Advertisements appear in previous issues.

Where-To-Buy Products Index carried quarterly.

	Page
A	
Abrasive Co.	*
Abrasive Products, Inc.	*
Acheson Colloids Corp.	*
Acme Galvanizing, Inc.	*
Acme Steel & Malleable Iron Works	*
Aetna-Standard Engineering Co., The	*
Ahlberg Bearing Co.	129
Air Reduction	*
Ajax Electrothermic Corp.	*
Alan Wood Steel Co.	*
Aldrich Pump Co., The	*
Allegheny Ludlum Steel Corp.	*
Allen-Bradley Co.	*
Alliance Machine Co.	*
Allis-Chalmers Mfg. Co.	9
Alloy Metal Abrasive Co.	*
Alrose Chemical Co.	*
Aluminum Company of America	24
American Agile Corp.	*
American Air Filter Co., Inc.	*
American Brass Co.	*
American Bridge Co.	*
American Cable Division of American Chain & Cable Co., Inc.	105
American Chain & Cable Co., Inc., American Cable Division	105
American Chain & Cable Co., Inc., American Chain Division	*
American Chain & Cable Co., Inc., Page Steel & Wire Division	*
American Chain & Cable Co., Inc., Wright Manufacturing Div.	*
American Chain Division of American Chain & Cable Co., Inc.	*
American Chemical Paint Co.	*
American Crayon Co., The	*
American Engineering Co.	*
American Foundry Equipment Co.	*
American Gas Association	*
American Hot Dip Galvanizers Association	*
American Metal Hose Branch of the American Brass Co.	*
American Metal Products Co.	*
American MonoRail Co.	61
American Nickeloid Co.	161
American Pulverizer Co.	*
American Roller Bearing Co.	*
American Rolling Mill Co., The	*
American Screw Co.	*
American Shear Knife Co.	132
American Steel & Wire Co.	*
American Tinning & Galvanizing Co.	*
Ampco Metal, Inc.	131
Amsler-Morton Co., The	*
Anaconda Wire & Cable Co.	121
Andrews Steel Co., The	*
Anker-Holth Mfg. Co.	*
Apex Machine & Tool Co., The	*
Armour Research Foundation	149
Armstrong-Blum Mfg. Co.	*
Atkins, E. C., & Co.	*
Atlantic Stamping Co.	*
Atlantic Steel Co.	*
Atlas Car & Mfg. Co.	146
Atlas Drop Forge Co.	163
Atlas Lumnite Cement Co.	*
Automatic Alarms, Inc.	*
B	
Babcock & Wilcox Co., Refractories Div.	*
Babcock & Wilcox Tube Co.	*
Bailey, Wm. M., Co.	*
Baker, J. E., Co.	159
Baker-Raulang Co.	*
Baldwin-Southwark Division, The Baldwin Locomotive Works	*
Bantam Bearings Corp.	10
Barium Stainless Steel Corp.	161
Barnes, Wallace, Co., Division of Associated Spring Corporation	*
Basic Refractories, Inc.	*
Bayard, M. L., & Co., Inc.	*
Bay City Forge Co.	*
Bay State Abrasive Products Co.	36
Beall Tool Co.	157
Beatty Machine & Mfg. Co.	*
Belmont Iron Works	161
Berger Manufacturing Div., Republic Steel Corp.	*
Bethlehem Steel Co.	1
Birdsboro Steel Foundry & Machine Co.	*
Bissett Steel Co., The	*
Bixby, R. W., Inc.	165
Blanchard Machine Co.	*
Blaw-Knox Co.	*
Blaw-Knox Division, Blaw-Knox Co.	*
Bliss, E. W., Co.	*
Bliss & Laughlin, Inc.	*
Blodgett, G. S., Co., Inc.	*
Bloom Engineering Co.	*
Bridgeport Brass Co.	135, 136
Bristol Brass Corp., The	*
Bristol Co., The	*
Brooke, E. & G., Iron Co.	161
Brosius, Edgar E., Co.	*
Brown & Sharpe Mfg. Co.	37
Brown Instrument Co., The	*
Brush Development Co., The	*
Bryant Chucking Grinder Co.	28
Bryant Machinery & Engineering Co.	21
Buda Co., The	*
Buffalo Galvanizing & Tinning Works, Inc.	*
Bullard Co., The	*
Bundy Tubing Co.	16
C	
Cadman, A. W., Mfg. Co.	*
Carboloy Co., Inc.	93
Carborundum Co., The	*
Cardox Corp.	*
Carey, Philip, Mfg. Co., The	126
Carnegie-Illinois Steel Corp.	*
Carpenter Steel Co., The	95
Cattie, Joseph P., & Bros., Inc.	*
Ceilcote Co., The	161
Central Screw Co.	*
Century Electric Co.	99
Chambersburg Engineering Co.	*
Champion Rivet Co., The	41
Chandler Products Corp.	*
Chicago Metal Hose Corp.	*
Chicago Perforating Co.	155
Chicago Rawhide Mfg. Co.	*
Chicago Tramrail Co.	*
Chicago Wheel & Mfg. Co.	*
Cincinnati Grinders, Inc.	*
Cincinnati Milling Machine Co.	*
Cincinnati Shaper Co., The	*
Cleereman Machine Tool Co.	21
Cleveland Automatic Machine Co.	*
Cleveland Cap Screw Co.	133
Cleveland-Cliffs Iron Co.	*
Cleveland Crane & Engineering Co.	29
Cleveland Hotel	*
Cleveland Pneumatic Tool Co., The	*
Cleveland Punch & Shear Works Co.	*
Cleveland Tool Engineering Co.	*
Cleveland Tramrail Division, Cleveland Crane & Engineering Co.	*
Cleveland Twist Drill Co., The	*
Cleveland Worm & Gear Co., The	*
Climax Molybdenum Co.	48
Cold Metal Products Co.	*
Colonial Broach Co.	*
Columbia Steel Co.	*
Columbus Die, Tool & Machine Co.	159
Commercial Metals Treating, Inc.	165
Cone Automatic Machine Co., Inc.	*
Consolidated Machine Tool Corp.	17
Continental Machines, Inc.	*
Continental Roll & Steel Foundry Co.	*
Continental Screw Co.	*
Continental Steel Corp.	11
Cooper-Bessemer Corp.	110
Copperweld Steel Co.	*
Corbin Screw Corp.	*
Cowles Tool Co.	155
Crane Co.	*
Cuban-American Manganese Corp.	*
Cullen-Friestedt Co.	*
Culvert Division Republic Steel Corp.	*
Cunningham, M. E., Co.	157
Curtis Pneumatic Machinery Division of Curtis Manufacturing Company	*
Cutler-Hammer, Inc.	*
D	
Darwin & Milner, Inc.	161
Davenport Besler Corp.	*
Davis & Thompson Co.	*
Davis Brake Beam Co.	163
Denison Engineering Co., The	5
DeSanno, A. P., & Son, Inc.	*
Despatch Oven Co.	*
Detroit Electric Furnace Division, Kuhlman Electric Co.	*
Detroit-Leland Hotel	162
Detroit Rex Products Co.	*
Detroit Tap & Tool Co.	*
DeWitt Operated Hotels	*
Diamond Expansion Bolt Co., Inc.	*
Diamond Tool Co.	159
Diebold Safe & Lock Co.	*
Dietert, Harry W., Co.	*
Disston, Henry, & Sons, Inc.	*
Dodge Manufacturing Corp.	*
Dow Chemical & Hoist Co.	107
Downs Crane & Hoist Co.	*
Doyle, J. E., Co., The	*
Drave Corp., Engineering Works Div.	*
Drave Corp., Machinery Div.	154
Dulien Steel Products, Inc.	164
E	
Easton Car & Construction Co.	*
Edison, Thomas A., Inc.	*
Egyptian Lacquer Mfg. Co., The	*
Elastic Stop Nut Corp.	*
Electric Controller & Mfg. Co.	*
Electric Furnace Co., The	138
Electric Storage Battery Co.	115
Electro Metallurgical Co.	39
Electroweld Steel Corp.	*
Elmes, Charles F., Engineering Works	*
Enterprise Galvanizing Co.	159
Equipment Steel Products Division of Union Asbestos & Rubber Co.	*
Erdle Perforating Co., The	155
Erie Forge Co.	*
Erie Foundry Co.	*
Etna Machine Co.	*
Euclid Crane & Hoist Co.	*
Eureka Fire Brick Works	161
Eutectic Welding Alloys Co.	*
Ex-Cell-O Corp.	*
F	
Fafnir Bearing Co., The	*
Fairbanks, Morse & Co.	*
Fairfield Mfg. Co.	*
Fanner Mfg. Co.	*
Farquhar, A. B., Co., Ltd.	*
Farval Corp., The	Inside Back Cover
Ferracute Machine Co.	*
Fidelity Machine Co.	*
Finn, John, Metal Works	*
Firth-Sterling Steel Co.	*
Fitchburg Grinding Machine Corp.	*
Fitzsimons Co., The	*
Flori Pipe Co., The	*
Foote Bros. Gear & Machine Corp.	6
Foster, Frank B.	164
Foster, L. B., Co., Inc.	164
Foxboro Co., The	*
Frasse, Peter A., & Co., Inc.	*
Fuller Brush Co.	*
G	
Galvanizers, Inc.	*
Galland-Henning Mfg. Co.	*
Garratt, Geo. K., Co.	143
General Abrasive Co.	*
General Blower Co.	163
General Electric Co.	34, 35
General Excavator Co.	*
General Steel Warehouse Co., Inc.	*
Genesee Tool Co.	*
Gisholt Machine Co.	*
Globe Brick Co., The	*
Granite City Steel Co.	*
Grant Gear Works	133
Graver Tank & Mfg. Co., Inc.	*
Graybar Electric Co.	44
Great Lakes Steel Corp.	*
Greenfield Tap & Die Corp.	30
Greenlee Brothers & Co.	164
Greenspon's, Jos., Son Pipe Corp.	164
Gregory, Thomas, Galvanizing Works	*
Grinnell Co., Inc.	*
Gruendler Crusher & Pulverizer Co.	*
H	
Hagan, George J., Co.	27
Halliden Machine Co., The	*
Hanlon-Gregory Galvanizing Co.	*
Hanna Engineering Works	*
Hanna Furnace Corp.	*
Hannifin Mfg. Co.	*
Hansen Mfg. Co.	32
Harbison-Walker Refractories Co.	*
Harnischfeger Corp.	*
Harper, H. M., Co., The	*
Harrington & King Perforating Co.	162
Hassal, John, Inc.	*
Hays Corp., The	*
Heald Machine Co.	Inside Front Cover
Helmer-Staley, Inc.	*
Hendrick Manufacturing Co.	155
Heppenstall Co.	*
Hevi-Duty Electric Co.	*
Hill, James, Mfg. Co.	*
Hindley Mfg. Co.	*
Hobart Bros. Co.	155
Homestead Valve Mfg. Co.	*
Horsburgh & Scott Co.	*
Houghton, E. F., & Co.	15
Howard Foundry Co.	*
Hubbard & Co.	*
Hubbard, M. D., Spring Co.	157
Hughes-Keenan Co., The	*
Hyatt Bearings Division, General Motors Corporation	*
Hyde Park Foundry & Machine Co.	*
Hydraulic Machinery, Inc.	97
Hydraulic Press Mfg. Co., The	*
Hydro-Arc Furnace Corp.	*
Hydropress, Inc.	*
I	
Illinois Clay Products Co.	*
Illinois Tool Works	*
Independent Engineering Co.	*
Independent Galvanizing Co.	*
Industrial Brownhoist Corp.	*
Ingersoll Steel & Disc Division, Borg-Warner Corp.	124
Inland Steel Co.	48
International Harvester Co., Wisconsin Steel Div.	12
International Nickel Co., Inc.	*
International Screw Co.	*
International-Stacey Corp.	*
Iron & Steel Products, Inc.	164
Irwin, H. G., Lumber Co.	*
Isaacson Iron Works	*
J	
Jackson Iron & Steel Co., The	*
James, D. O., Mfg. Co.	*
Jessop Steel Co.	*
Jessop, Wm., & Sons, Inc.	*
Johns-Manville Corp.	*
Johnson Bronze Co.	*
Johnson Gas Appliance Co.	125
Johnson Steel & Wire Co., Inc.	134
Jones & Lamson Machine Co.	*
Jones & Laughlin Steel Corp.	*
Jones, W. A., Foundry & Machine Co.	*
Joslyn Co. of California	*
Joslyn Mfg. & Supply Co.	*
K	
Kane & Roach, Inc.	*

(Continued on next page)

ADVERTISING INDEX

*Advertisements appear in previous issues.

Where-To-Buy Products Index carried quarterly.

(Continued from preceding page)

Page

Kardong Brothers, Inc. 153
Kearney & Trecker Corp. *
Kemp, C. M., Mfg. Co. *
Kester Solder Co. *
Keystone Steel & Wire Co. *
Kidde, Walter, & Co., Inc. 31
King Fifth Wheel Co. *
King Foundries, Inc. 165
Kinnear Mfg. Co. *
Kirk & Blum Mfg. Co. 165
Kold-Hold Manufacturing Co. *
Koppers Co. *
Koven, L. O., & Brother, Inc. *
Kropp Forge Co.

L

Ladish Drop Forge Co. 23
Lake City Malleable Co. *
Lakeside Steel Improvement Co., The *
Lamson & Sessions Co., The *
Lamson Corp. *
Landis Machine Co. *
Lang Machinery Co. 164
Latrobe Electric Steel Co. *
Laughlin, Thomas, Co., The *
Layne & Bowler, Inc. 137
Lebanon Steel Foundry *
LeBlond, R. K., Machine Tool Co., The *
Leeds & Northrup Co. *
Lee Spring Co., Inc. *
Lehigh Structural Steel Co. *
Lempco Products, Inc. *
Lepel High Frequency Laboratories, Inc. 159
Leschen, A., & Sons Rope Co. *
Levinson Steel Co., The *
Levinson Steel Sales Co. 18
Lewin-Mathes Co. 33
Lewis Bolt & Nut Co. *
Lewis Foundry & Machine Division of Blaw-Knox Co. *
Lewis Machine Co., The *
Lincoln Electric Co., The *
Linde Air Products Co., The *
Link-Belt Co. *
Lintern Corp., The *
Liquid Carbonic Corp., The *
Logemann Bros. Co. *
Lovejoy Flexible Coupling Co. *
Luers, J. Milton 153
Lyon-Raymond Corp. *

Mc

McKay Co., The *
McKay Machine Co. *
McKee, Arthur G., Co. *
McKenna Metals Co. 26

M

MacDermid, Inc. 75
Mackintosh-Hemphill Co. 109
Macklin Co. *
Macwhyte Co. *
Magnus Chemical Co. *
Mahr Manufacturing Co. *
Mallory, P. R., & Co., Inc. 42
Manheim Manufacturing & Belting Co. *
Mathews Conveyer Co. *
Matthews, Jas. H., & Co. 153
Mattison Machine Works *
Meehanite Research Institute *
Mercury Mfg. Co. *
Mesta Machine Co. *
Metal & Thermit Corporation 71
Michiana Products Corp. *
Michigan Tool Co. *
Micromatic Hone Corp. *
Midvale Co., The *
Milton Mfg. Co., The 159
Milwaukee Foundry Equipment Co. *
Minnesota Mining & Mfg. Co. *
Mississippi Valley Structural Steel Co. *
Missouri Rolling Mill Corp. *
Moltrup Steel Products Co. *
Molybdenum Corporation of America *
Monarch Machine Tool Co., The 44
Monarch Steel Co. *
Morgan Construction Co. *
Morgan Engineering Co. *
Morrison Engineering Corp. *
Motch & Merriweather Machinery Co. *
Motor Repair & Mfg. Co. 163
Motor Products Corp. 19

N

National Acme Co. *
National Bearing Metals Corp. *
National Carbon Co., Inc., Carbon Sales Division *
National-Erie Corp. *
National Fireproofing Corp. 163
National Lead Co. *
National Lock Washer Co. *
National Machinery Co., The *
National Roll & Foundry Co. *
National Screw & Mfg. Co. *
National Steel Corp. 22
National Telephone Supply Co. *
National Tube Co. *
New Departure Division General Motors Corp. Front Cover
New England Screw Co. *
New Jersey Zinc Co. *
Newport Rolling Mill Co., The *
New York & New Jersey Lubricant Co. 147
Niagara Machine & Tool Works *
Niles Steel Products Div., Republic Steel Corp. *
Nilson, A. H., Machine Co. 165
Nitralloy Corp., The *
Norma-Hoffmann Bearings Corp. *
Northwest Engineering Co. *
Norton Co., The *

O

Ohio Crankshaft Co. *
Ohio Electric Mfg. Co. 159
Ohio Galvanizing & Mfg. Co. 159
Ohio Knife Co., The *
Ohio Locomotive Crane Co., The 159
Ohio Machine Tool Co., The *
Ohio Seamless Tube Co., The *
Ohio Steel Foundry Co., The *
Oliver Iron & Steel Corp. *
O'Neil-Irwin Mfg. Co. 160
Osgood Co., The *
Ostendorf-Morris Co. *
Oster Mfg. Co., The 123

P

Page Steel & Wire Division American Chain & Cable Co., Inc. *
Pangborn Corp. *
Parker, Charles, Co. *
Parker-Kalon Corp. *
Pawtucket Screw Co. *
Penn Galvanizing Co. *
Pennsylvania Flexible Metallic Tubing Co. *
Pennsylvania Industrial Engineers *
Pennsylvania Salt Mfg. Co. *
Pheoll Mfg. Co. *
Philadelphia Gear Works *
Philadelphian Hotel 159
Phillips Screw Manufacturers *
Phoenix Mfg. Co. *
Pittsburgh Crushed Steel Co. *
Pittsburgh Gear & Machine Co. *
Pittsburgh Lectromelt Furnace Corp. *
Pittsburgh Rolls Division of Blaw-Knox Co. *
Plymouth Locomotive Works Division of The Fate-Root-Heath Co. *
Pollock, William B., Co., The *
Poole Foundry & Machine Co. 160
Porter, H. K., Co., Inc. *
Pressed Steel Car Co., Inc. *
Pressed Steel Tank Co. *
Prestole Division, Detroit Harvester Co. *
Progressive Welder Co. *
Protected Steel Products Co. *
Purdy, A. R., Co., Inc. 40

R

Racine Tool & Machine Co. 25
Ransohoff, N., Inc. 158
Ransome Machinery Co. *
Raymond Mfg. Co., Division of Associated Spring Corp. *
Reading Chain & Block Corp. *
Ready-Power Co. *
Reliance Electric & Engineering Co. *
Republic Steel Corp. *
Revere Copper & Brass, Inc. 91
Rhoades, R. W., Metaline Co., Inc. *
Riverside Foundry & Galvanizing Co. *
Roebling's, John A., Sons Co. *
Rollway Bearing Co., Inc. *
Roosevelt Hotel 132
Roper, George D., Corp. *
Ross Heater & Mfg. Co., Inc. 151
R-S Products Corporation *
Ruemelin Mfg. Co. *
Russell, Burdsall & Ward Bolt & Nut Co. *
Ryerson, Joseph T., & Son, Inc. 161

S

Saginaw Malleable Iron Div. General Motors Corp. *
St. Louis Button Co. 157
Salem Engineering Co. *
Samuel, Frank, & Co., Inc. *
San Francisco Galvanizing Works *
Sanitary Tinning Co., The *
Scaife Co. *
Scherr, George, Company *
Scovill Mfg. Co. *
Sellers, Wm., & Co., Inc. *
Seneca Wire & Mfg. Co., The 161
Seymour Manufacturing Co. *
Shakeproof, Inc. *
Shaw-Box Crane & Hoist Division, Manning Maxwell & Moore, Inc. *
Sheffield Corp., The *
Shell Oil Co., Inc. 119
Shenango Furnace Co., The *
Shenango-Penn Mold Co. *
Shepard Niles Crane & Hoist Corp. 150
Shuster, F. B., Co., The 153
Silent Hoist Winch & Crane Co. *
Simonds Gear & Mfg. Co. 157
Simonds Saw & Steel Co. *
Sinclair Refining Co. *
SKF Industries, Inc. *
Smith, David, Steel Co., Inc. 161
Smith Oil & Refining Co. *
Smith Tool & Engineering Co. 153
Snyder, W. P., & Co. *
Socony-Vacuum Oil Co., Inc. *
Sonken-Galamba Corp. *
South Bend Lathe Works 113
Southern Galvanizing Co. *
Southington Hardware Mfg. Co. *
Spriesch Tool & Manufacturing Co. *
Standard Galvanizing Co. *
Standard Steel Works *
Standard Tube Co., The 102
Stanley Works, The *
Steel & Tubes Division, Republic Steel Corp. *
Steel Founder's Society of America *
Steelweld Machinery Division, Cleveland Crane & Engineering Co. 29
Sterling Grinding Wheel Div. of The Cleveland Quarries Co. *
Strom Steel Ball Co. *
Strong Steel Foundry Co. *
Struthers Wells Corp. *
Stuart, D. A., Oil Co. *
Sturtevant, B. F., Co. *
Sun Oil Co. *
Sundstrand Machine Tool Co. *
Superior Sheet Steel Co., The 11
Superior Steel Corp. *
Surface Combustion Corp. *
Swindell-Dressler Corp. *

T

Taylor-Wilson Mfg. Co. 153
Tennessee Coal, Iron & Railroad Co. *
Texas Co., The 7
Thomas Machine Mfg. Co. 148
Thomas Steel Co., The *
Tide Water Associated Oil Co. *
Timken Roller Bearing Co. Back Cover
Timken Steel & Tube Division, The Timken Roller Bearing Co. *
Tinnerman Products, Inc. 73
Titanium Alloy Manufacturing Co. *
Toledo Stamping & Mfg. Co. *
Tomkins-Johnson Co., The *
Torrington Co., The 20
Towmotor Company *
Trico Products Corp. *
Triplex Screw Co., The *
Truscon Steel Co. *
Tubular Service Corp. *
Turco Products Inc. *

U

Udylite Corp., The 130
Union Carbide & Carbon Corp. 39
Union Drawn Steel Div., Republic Steel Corp. *
United Chromium, Inc. *
United Engineering & Foundry Co. 2, 3
United States Graphite Co. 152
United States Steel Corp., Subsidiaries *
United States Steel Export Co. *
United States Steel Supply Co. *

V

Valley Mould & Iron Corp. *
Vanadium Alloys Steel Co. *
Vanadium Corporation of America *
Van Dorn Iron Works Co., The *
Vaughn Machinery Co., The 43

W

Waldron, John, Corp. *
Walker-Turner Co., Inc. *
Warner & Swasey Co. *
Washburn Wire Co. 8
Watson-Stillman Co., The *
Wean Engineering Co., The *
Weatherhead Co., The *
Webb Corporation, The 153
Weinman Pump & Supply Co., The 159
Weirton Steel Corp. 22
Welding Equipment & Supply Co. 128
Wellman Bronze & Aluminum Co. 137
Wellman Engineering Co. *
Wells Manufacturing Corp. *
Westinghouse Electric & Mfg. Co. 13
West Penn Machinery Co. 163
West Steel Casting Co. 163
Wheeling Steel Corporation 161
Whitcomb Locomotive Co., The *
Whitehead Stamping Co. *
Whitney Screw Corp. *
Wickes Brothers *
Wickwire Brothers, Inc. 155
Wilcox, Crittenden & Co., Inc. *
Williams, J. H., & Co. 163
Wilson, Lee, Engineering Co. *
Wilson Welder and Metals Co., Inc. *
Wisconsin Motor Corp. *
Wisconsin Steel Div., International Harvester Co. 12
Witt Cornice Co., The *
Wolverine Tube Div., Calumet & Hecla Consolidated Copper Co. *
Wood, R. D., Co. *
Worthington Pump & Machinery Corp. *
Worth Steel Co. 38
Wright Manufacturing Div., American Chain & Cable Co., Inc. *
Wrigley Co., The *
Wyckoff Drawn Steel Co. *

Y

Yoder Co., The 14
Youngstown Alloy Casting Corp. *
Youngstown Sheet & Tube Co., The *

Z

Zeh & Hahnemann Co. *

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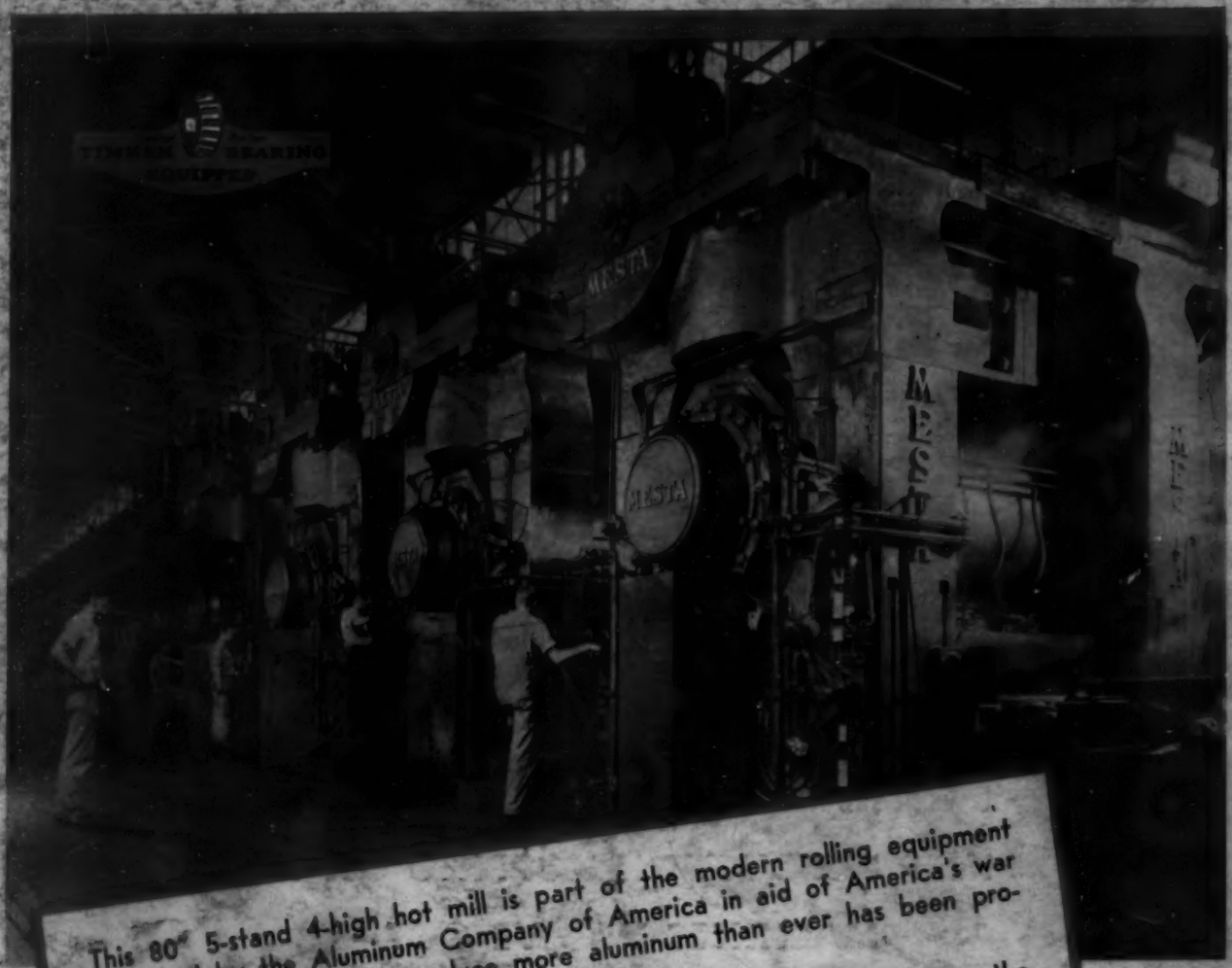

This 80" 5-stand 4-high hot mill is part of the modern rolling equipment operated by the Aluminum Company of America in aid of America's war effort. It is helping to produce more aluminum than ever has been produced in this country before.

All back-up and work rolls are mounted on Timken Roll Neck Bearings; the screwdowns also are Timken Bearing Equipped. This assures maximum speed and precision; quicker, easier roll changing (no delicate parts to handle); greatly simplified lubrication; long bearing life (Timken Roll Neck Bearings hold all records for tonnage rolled); and fewer involuntary mill shutdowns.

It isn't necessary to relieve the roll pressure when re-starting a Timken Bearing Equipped mill after a temporary stoppage. That's because there is no absence of lubricant between the bearing surfaces. The mill starts smoothly and easily under full load; product gauge is accurately maintained; and a considerable production saving effected. Put your mills —new or old—on Timken Bearings for an earlier Victory and continued success afterwards. The Timken Roller Bearing Company, Canton, Ohio.

"All There Is **TIMKEN** *In Bearings*"

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TAPERED ROLLER BEARINGS

The One Test For Every Decision—Will It Help To Win The War?